the OIL AND GAS JOURNAL

here's a faster, safer way to handle casing

BJ CASING SPIDER CASING ELEVATOR

WHETHER IT'S 3000 FEET OR 3 MILES, see that your casing jobs have the automatic safety features, pipe-handling ease, and quickly changed slip sizes characteristic of BJ Casing Equipment.

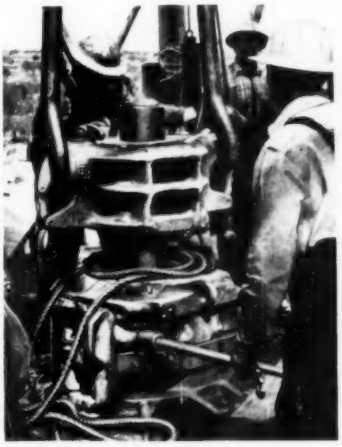
CHECK THESE BJ SPIDER ADVANTAGES

Easy to Use

1. One man operates the automatic lever to set slips.
2. Spider easily removed after pipe is set by opening stirrup-type latch.
3. Replaceable insert-type slips.
4. Slip sizes easily changed.
5. Easy to lubricate alemite fittings and oil cups.

Safer for Crew and Hole

1. Double-locks. Cannot open when string is being supported.
2. Slips must be fully retracted before latch can open.
3. One man operates automatic lever. Stays clear and avoids accidents.
4. Releasing the lever sets slips automatically.
5. Holds the heaviest strings safely.
6. Four 18" slips grip uniformly without crushing, crimping, bottlenecking.



FOR MORE OPERATING ADVANTAGES . . . for faster, safer casing handling, specify this BJ Equipment for your own or your contractor's rig. Handles any length string. Handles a wide range of diameters with interchangeable full-length slips. Remember, it's BJ Engineered Oil Tools for better performance on rigs throughout the world. Contact your local BJ representative or write today for the *new* BJ Casing Equipment Bulletin.

FASTER, SAFER OPERATION WITH THE BJ ELEVATOR

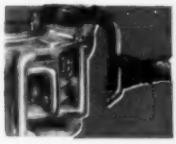
Easy to Use

1. Readily balanced by adjustable balancing blocks.
2. One man easily closes the elevator on the pipe.
3. Elevator can be removed quickly for use on other jobs.
4. Slip-setting lever sets slips quickly at any desired point.
5. Replaceable insert-type slips.

Safer pipe-handling

1. Door cannot open while elevator is loaded.
2. With door closed, neither upset nor coupling can pass through the elevator.
3. Slips may be set manually or will set automatically on contact with collar or upset.
4. Slips may be locked in set position.
5. Four full-length interlocking slips have added safety lock feature.

One man actuates the slips with the automatic lever . . . lug on end of lever drops into a slot in the latch and provides an additional safety feature.



Slips are easily set at any desired point by operating the slip-setting lever.

BJ MEANS ENGINEERED OIL TOOLS

Byron Jackson Co.

Since 1872

MAIN OFFICE AND PLANT, LOS ANGELES 54, CALIF.

Mid-Continent Office and Plant, Houston 1, Tex.
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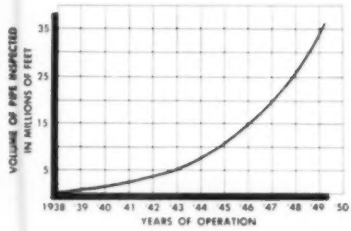
Branches in All Principal Oil Fields

IN SELECTING TUBULAR INSPECTION SERVICE, LOOK FOR THESE ESSENTIAL QUALIFICATIONS:

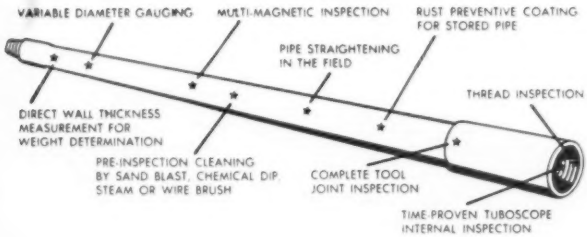
Long-experienced Personnel
Most Complete Technical Facilities
Hemisphere-wide Availability

ONLY Tuboscope OIL FIELD TUBULAR INSPECTION OFFERS ALL THREE!

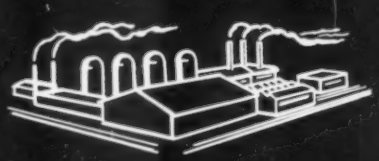


In a business as highly specialized as pipe inspection, experience is of paramount importance to high quality work. Every Tuboscope inspection is backed by 35 million feet of experience!

In bringing laboratory-precision inspection to the oilfields, Tuboscope has not lost sight of the meaning of the word "service". Wherever there is drilling activity . . . from Canada to Colombia . . . there Tuboscope Inspection service is available as an integral part of modern drilling practice.


VARIABLE DIAMETER GAUGING
MULTI-MAGNETIC INSPECTION
RUST PREVENTIVE COATING FOR STORED PIPE
PIPE STRAIGHTENING IN THE FIELD
THREAD INSPECTION
DIRECT WALL THICKNESS MEASUREMENT FOR WEIGHT DETERMINATION
PRE-INSPECTION CLEANING BY SAND BLAST, CHEMICAL DIP, STEAM OR WIRE BRUSH
COMPLETE TOOL JOINT INSPECTION
TIME-PROVEN TUBOSCOPE INTERNAL INSPECTION

In addition, Tuboscope offers a variety of miscellaneous inspection services for core barrels, subs, drill collars, kellys and other drilling equipment. For tool joints designed to be changed in the field, a re-tool jointing service is available in South America and Canada.



Of special value to operators in foreign fields is Tuboscope's New Pipe Inspection Yard in the Pittsburgh area. Here, new pipe can be graded before shipment to distant points.

Tuboscope
DIVISION OF
TUBULAR SERVICE & ENGINEERING CO.
COMMERCE BLDG. HOUSTON, TEXAS

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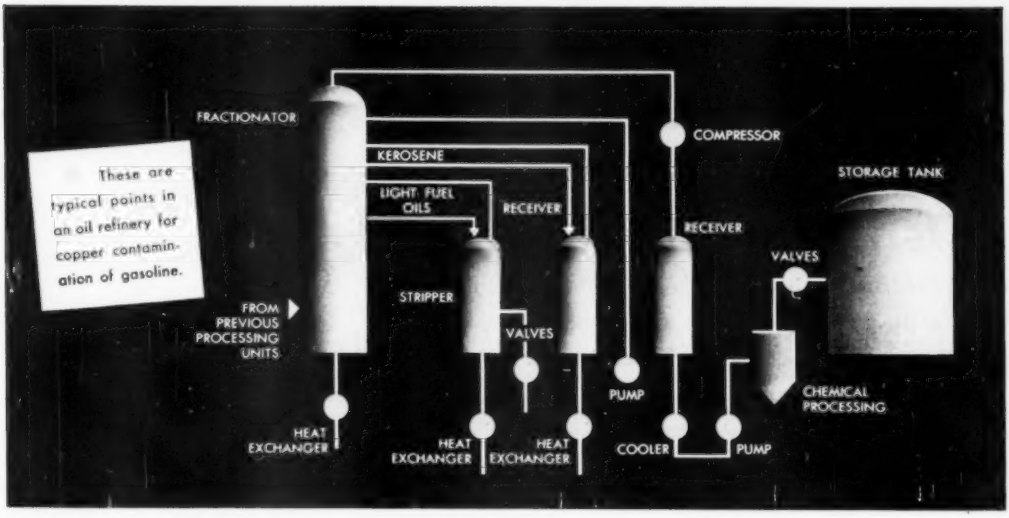
OKLAHOMA CITY, CASPER
VENTURA, CALIFORNIA FOR WEST COAST
CARNEGIE, PENNSYLVANIA FOR EASTERN U. S.
EDMONTON, ALBERTA FOR WESTERN CANADA
CARACAS, VENEZUELA FOR SOUTH AMERICA

Do you realize the *many places* *Copper* can contaminate your gasoline?



To Control Copper Effectively Use Du Pont Metal Deactivator

Copper, always a potential source of trouble for the refiner, may be picked up from brass condensers, heat exchangers, valves, coolers, pumps, strainers, and other equipment. It only takes one part of copper in several million parts of gasoline to have a decided pro-oxidant effect and it is frequently hard to detect these traces by ordinary analytical methods.

The use of Du Pont Metal Deactivator offers an economical means for improving storage stability of gasoline containing copper. In every case overcoming the catalytic effect of copper is more economical with Metal Deactivator than an attempt at stabilization with anti-oxidants alone.

Deactivator effectivness may be readily determined by induction period tests. An increase in induction period with the addition of Metal Deactivator nearly always indicates the presence of copper.

For further information on this effective means of copper control, ask your Du Pont Petroleum Chemicals Representative or write the nearest District Office.

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PETROLEUM CHEMICALS

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E. I. DU PONT DE NEMOURS & COMPANY (INC.)
Petroleum Chemicals Division • Wilmington 98, Delaware

BETTER THINGS FOR BETTER LIVING
... THROUGH CHEMISTRY

District Offices: Wilmington, Del.; Chicago, Ill.; Tulsa, Okla.; Houston, Texas; Los Angeles, Calif.

District Laboratories: Wilmington, Del.; Chicago, Ill.; Tulsa, Okla.; Houston, Texas; El Monte, Calif.

Say...
you left your motor running!
Do you run your motor 24 hours a day, every day? That's all right, if it's a Fairbanks-Morse motor, you can leave it on the job and forget about it. Fairbanks-Morse motors are built to take on the toughest assignments, to give the finest, trouble-free service. They require minimum attention . . . they assure lowest maintenance costs. Complete information about the full line of Fairbanks-Morse electric motors is contained in the handy POCKET PANORAMA. Write to Fairbanks, Morse & Co., Chicago 5, Ill.
FAIRBANKS-MORSE
A name worth remembering
OIL FIELD EQUIPMENT • DIESEL LOCOMOTIVES • DIESEL ENGINES
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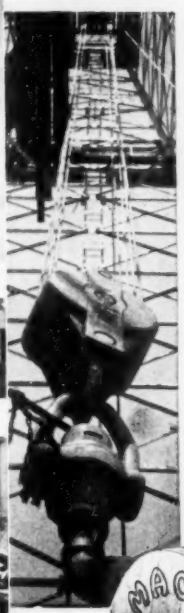
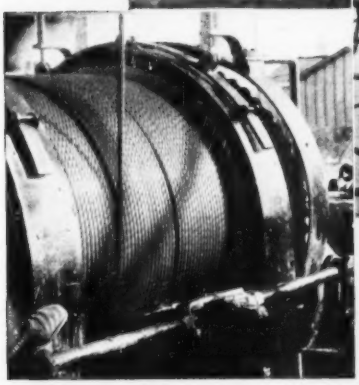
RAILROAD MOTOR CARS, STANDPIPES • FARM MACHINERY
FM

Macwhyte PREformed Rotary Lines

Correct for your drilling equipment





For maximum safety, service, dependability, use Macwhyte PREformed Monarch Whyte Strand Rotary Lines.

It's PREformed for flexibility, easy handling and maximum service. It runs smoothly through blocks and spools evenly on drum.

Internal Lubrication covers every wire in the line . . . protecting unseen inside wires. Monarch Whyte Strand PREformed Rotary Lines are available in the size and length you need. Macwhyte Distributors and Mill Depots — carry stocks for immediate delivery. Macwhyte representatives will recommend the correct line for your equipment.

MACWHYTE COMPANY

2916 Fourteenth Avenue · Kenosha, Wisconsin

Manufacturers of Internally Lubricated Wire Rope, Braided Wire Rope Slings, Aircraft Cables and Assemblies.

Mill Depots: New York · Pittsburgh · Chicago Minneapolis · Fort Worth · Portland · Seattle San Francisco · Los Angeles

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Other Macwhyte Wire Lines for the oil industry:

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Winch Lines
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AVAILABLE NOW!

AMERICAN IRON TUBING TOOL JOINTS

● American Iron Tubing Tool Joints are designed for use on tubing when it is used for completion, workover and deepening. In these joints the outside diameter and inside diameter of the tubing tool joint is the same as the outside diameter of the tubing coupling and the inside diameter of the tubing (as shown at right).

The use of tubing tool joints eliminates wear and abuse on the tubing and tubing coupling threads due to making and breaking of stands at the point where the tubing tool joints are installed on the string.

When the tubing is run to produce the well, the tubing tool joints are removed and the user is assured of pressure tight connections, since all thread wear has been on the tubing tool joint connections.

In the manufacture of American Iron Tubing Tool Joints the most accurate heat-treating methods known are provided by our new controlled-atmosphere furnace, shown below. A section of our fully equipped tool joint plant is also shown below.

AMERICAN IRON & MACHINE WORKS CO.
Oklahoma City, Oklahoma – Box 1177
Phone L. D. 518 – District Office, Houston, Texas – Export Office: 11 West 42nd St., New York City, N. Y.

Manufactured to the same rigid specifications and same analysis steel as the American Iron

Straight Grip and AMWELD

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LONGER Chain Life
means
INCREASED Drilling Profits!

LINK-BELT
gives you 6 Simple Pointers on HOW to get
. . . "longer service with less maintenance"

Regardless of the make of your rig chains, follow these 6 simple Link-Belt suggestions and you'll increase your drilling profits!

1 — PROPER ALIGNMENT . . . check your sprockets *periodically* for alignment. Misalignment develops side-pull, concentrating the load on one side of sprocket teeth and chain. Such unbalanced load — indicated by wear on sprocket faces and inside surfaces of sidebars — shortens life of both sprockets and chains. Align properly and *save money!*

2 — PROPER ADJUSTMENT . . . run chains just a trifle more slack than a belt. Too much tension causes undue wear on chain and damaging friction on bearings. But a chain too slack will ride sprocket teeth and cause breakage, or even permit chain to jump off sprocket. Adjust properly and *save money!*

3 — PROPER LUBRICATION . . . use good, light mineral oil *only*. Faulty lubrication kills more chains than years of normal service. The presence of oil on outer chain surfaces does not necessarily mean that chain is properly lubricated. To be effective, the lubricant must penetrate between pins and bushings—constantly. To prevent corrosion, reduce friction and wear, lengthen chain and sprocket life . . . lubricate properly and *save money!*

4 — PROPER CLEANING . . . clean and lubricate chains *frequently* — remove chain occasionally for more thorough cleaning. Before replacing in service, *always* dip the chain in good, light lubricating oil — and *turn over slowly* until lubricant has penetrated all parts. Keep mud and dirt away from chains — prevent corrosion. A good rule: remove and *thoroughly clean* chains every time you move rig. Clean properly and *save money!*

5 — PROPER SPROCKETS . . . inspect sprocket teeth *regularly*. Worn teeth damage chain. Slightly worn teeth can be improved by grinding. But if teeth are broken or badly worn, sprocket should be replaced immediately. Another good rule: never install new chain on worn sprockets. Keep sprockets in proper condition and *save money!*

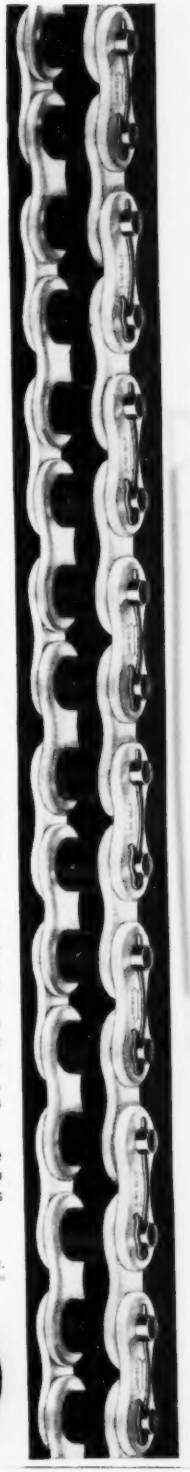
6 — PROPER CHAINS . . . *selection* of proper chains — as well as sprockets — is the final secret to Link-Belt's "*longer service with less maintenance*". Drives must be suitable to power transmission required. Chain should be inspected regularly. If these 6 pointers are observed, you'll seldom replace Link-Belt chains. Use Link-Belt chains and sprockets — and *save money!*

• If you want further advice on chain and sprocket care, please write us. And if you want "*longer service with less maintenance*" . . . if you want to increase your drilling profits . . . *always specify* LINK-BELT chains and sprockets.

LINK-BELT COMPANY

Indianapolis 6, Dallas 1, Houston 3, Los Angeles 33, Kansas City 6, Mo., New York 7, Toronto 8.
Distributors in all fields. 11.108

LINK-BELT
CHAINS AND SPROCKETS
A Type for Every OIL INDUSTRY SERVICE



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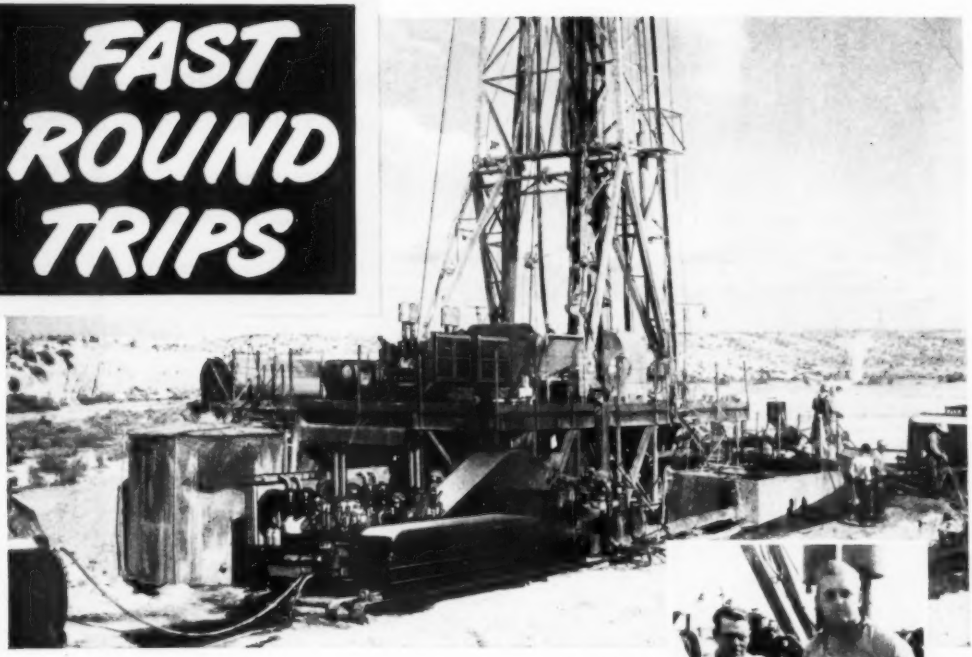
FAST ROUND TRIPS



Emsco GA 500 draw works and Emsco CA 16 mud pump, each powered by two GM Diesel Twin Sixes, drilling to 8000 feet near McKittrick, Calif.

(Left) Clyde Hall, owner Clyde Hall Drilling Co. (Right) Ray Ferguson, tool pusher for Hall.

SPEAKING of the four General Motors Series 71 Diesel Twins that power his rig, Clyde Hall says:

> *"We can really make hole fast with GM Diesels. We can pull 6300 feet of pipe in an hour and fifteen minutes . . . and we can tear down, move and be drilling on a new location within four days."*

Years of experience prove that GM Diesels can't be beat for a fast drilling operation. They pack more power in less bulk, providing the ultimate in portability with no sacrifice in horsepower. Because of their 2-cycle operation —power at every downstroke—GM Diesels pick up their load fast. They offer unmatched flexibility in any oil field operation.

These are a few of the reasons why more and more drilling contractors are turning to General Motors Diesels. Choose from "Singles," "Twins" or "Quads"—46 to 520 continuous BHP. Write for 16-page illustrated booklet, "GM Diesel Oil Field Engines."

DETROIT DIESEL ENGINE DIVISION

SINGLE ENGINES...Up to 200 H.P. **DETROIT 28, MICHIGAN** MULTIPLE UNITS...Up to 800 H.P.

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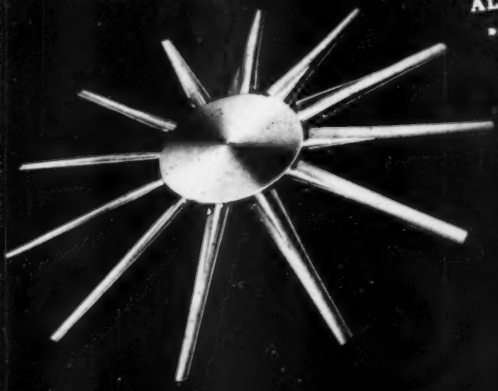
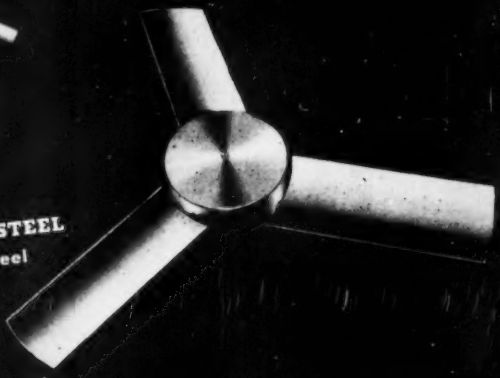
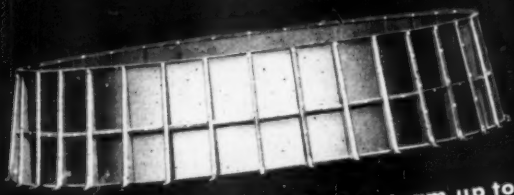
NEW Marley FANS
For Cooling Towers and DriCooler* Do The Job Better . . . Longer



ALUMINUM
- Multibladed
- Balanced
- Unusually quiet and smooth operation
- High tensile cast aluminum alloy
- Adjustable pitch
- Air foil section
- Twisted and tapered blades



STAINLESS STEEL
- All stainless steel
- Adjustable pitch
- Balanced
- Air foil section
- Quiet and smooth operation



FAN CYLINDER
- Unusually rugged
- All bolted
- Flared throat
- Non-corrosive

Marley Fans and Fan Cylinders team up to do the job better . . . longer! These fans are designed and manufactured by The Marley Company especially and exclusively for water cooling applications.

Your new MARLEY Water Cooling Tower or "DriCooler"* will have this equipment, but you can improve your present water cooling tower, right now, regardless of size or make with these new MARLEY FANS.

*DriCooler is the exclusive trade-mark of The Marley Company, Inc., and designates its finned tube dry surface cooling equipment.

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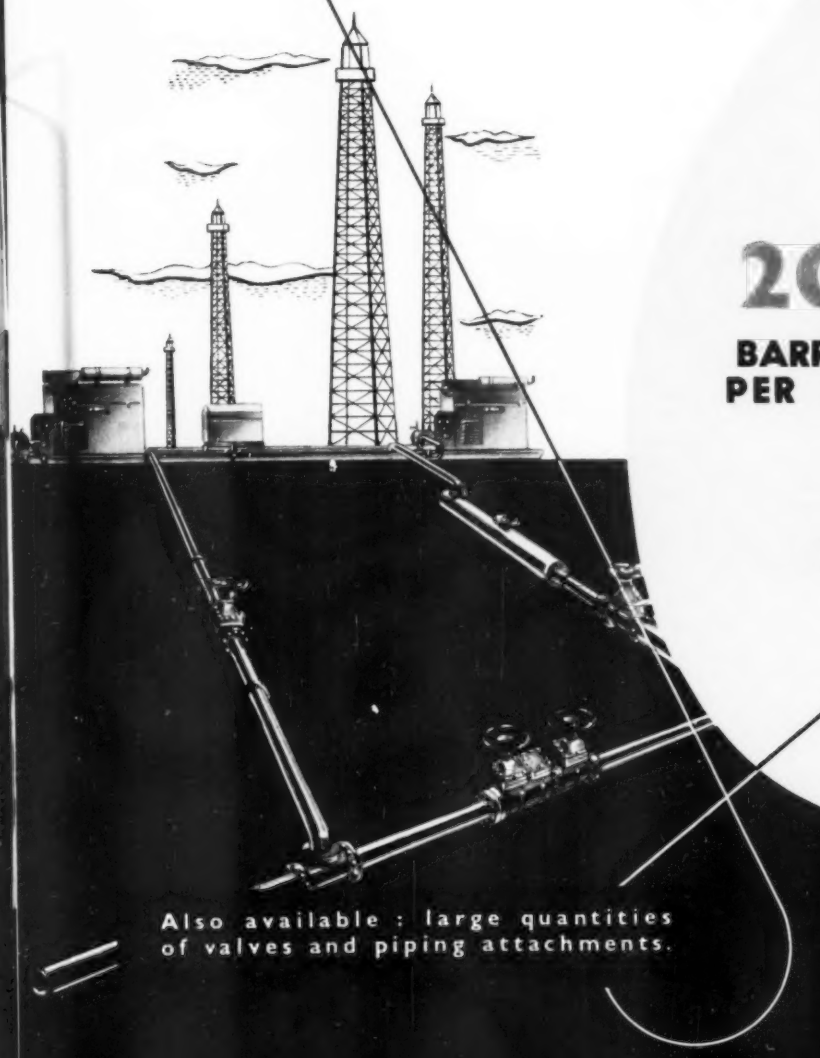

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Also available : large quantities of valves and piping attachments.

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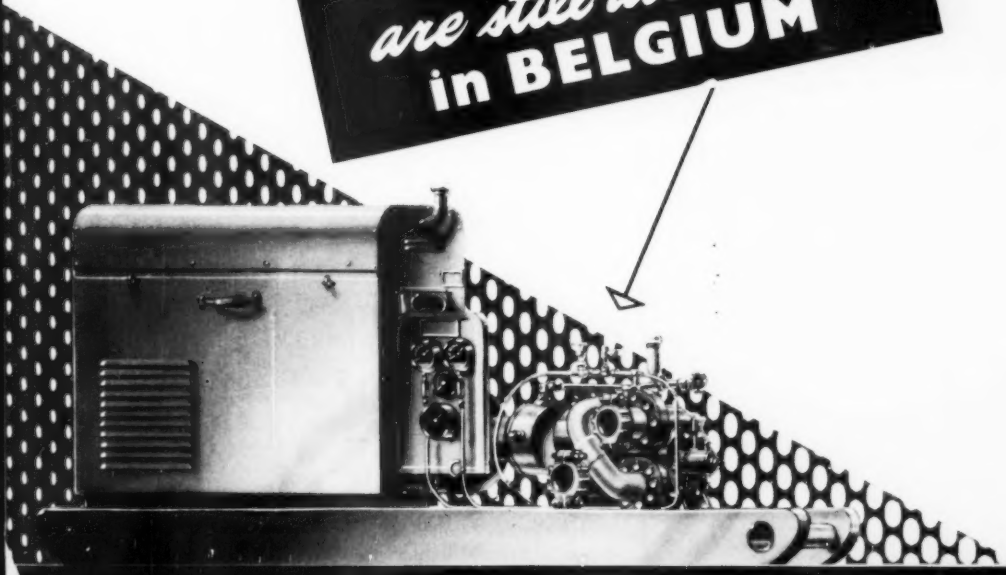
in BELGIUM



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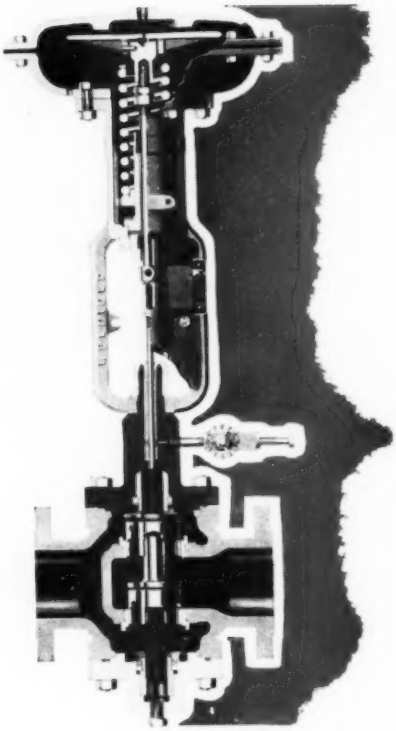
YOU GET ALL 3

with the

BELFIELD "700"

Diaphragm Control Valve



1 Advanced Design

Such attractions as Premolded Neoprene Diaphragm with Rolling Action . . . Pivot-Mounted Inner Plate and Cradle-Mounted Upper Spring Flange . . . Duplex Bearings for Stem . . . One-Piece Bonnet . . . Top and Bottom-Guided Disc . . . *all in addition to the usual features you expect in a fine valve.*

2 Proved Quality

The kind of quality that provides enduring reliability with a minimum of maintenance . . . the result of more than 100 years of experience with the right design, the right material, the right specification for each and every job.

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Every Belfield Valve is backed by the entire Minneapolis-Honeywell network of branch offices and factory-trained field engineers, as near to you as your phone.

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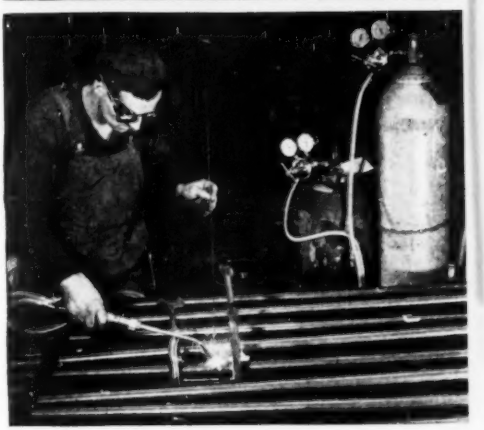
AND PROCESS CONTROL SPECIALTIES

Belfield VALVES

National Headquarters

. . . for pipe welding equipment and "know how"



For more than a quarter of a century, Airco has been supplying the petroleum industry with oxyacetylene flame and electric arc equipment, and technical "know how".

Both the oxyacetylene flame and electric arc provide valuable aid to the industry in many ways – in welding transmission pipe lines and refinery piping; in the fabrication, erection and alteration of structural units; in rebuilding and repairing worn and broken equipment of every type.

The Airco line includes: hand torches and tips, gases, regulators, portable pipe cutting and beveling machines, welding rods, arc welding machines and electrodes. In addition, Airco customers get an important "extra" – information and assistance from experienced technical representatives.

Because Airco carries complete lines of both oxyacetylene and electric welding supplies and equipment, Airco technicians can give unbiased advice in their recommendations.

We have available two interesting pipe welding reprints. If you would like a free copy of either, or both, or a copy of our general condensed catalog, just fill in and mail the coupon below. Air Reduction, 60 East 42nd St., New York 17, N. Y. In Texas: Magnolia Airco Gas Products Company, Houston 1, Texas. On West Coast: Air Reduction Pacific Company, San Francisco 4, Calif.

OG-7868
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Please send me a copy of:

- ☐ "The Welding of Piping" ADR 4A
- ☐ "The Welding of Process Piping" ADR 28
- ☐ "Airco Gas Welding and Cutting and Arc Welding Supply Catalog" ADC 640

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You'll save

IN THE END . . with Alloy Steels

● Contrary to what you may have heard, alloy steels are not expensive to use—actually, THEY COST LESS IN THE LONG RUN.

That's because of their high strength and toughness—and the hard, wear-resisting surfaces that they produce when properly heat-treated.

Thus, they are able to stand up longer in hard service . . . to keep oil country drilling equipment on the job day after day . . . to keep repair and replacement costs down to welcome levels.

Republic—world's leading producer of alloy steels—is well qualified to tell you just what these fine steels can do for you—performance-wise and cost-wise. Just name the date on which you'd like a metallurgist to call.

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GENERAL OFFICES • CLEVELAND 1, OHIO
Export Department: Chrysler Building, New York 17, N.Y.

For years, alloy steels have been proving their money-saving ability in drill bits, tool joints, subs, swivels, kellys, blocks, hooks and draw-works parts. They can do the same for you. Write us for further details.

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Other Republic Products include Casing—Tubing—Line Pipe—Upson Studs, Bolts, Nuts and Rivets—Electrunite Boiler Tubes

BLACK GOLD "MINED" ON SKF BEARINGS

Day-in, day-out oil field equipment takes rugged punishment, yet these industrial units continue to run efficiently. That's where SKF Spherical Roller Bearings play an important part. These bearings are designed and manufactured to withstand the severest operation.

Here's where and why SKF Bearings are specified:

Draw Works: SKF Spherical Roller Bearings give greater efficiency and economy because they provide for misalignment resulting from warpage where a built-up construction is used.

Compound Drives and Transmissions: SKF Bearings accurately locate the various shafts . . . the self-aligning features of the bearing eliminate binding.

Rotary Tables: The bevel helical gears on pinion shafts call for accurate locating under heavy radial and thrusts loads. SKF Bearings do the job.

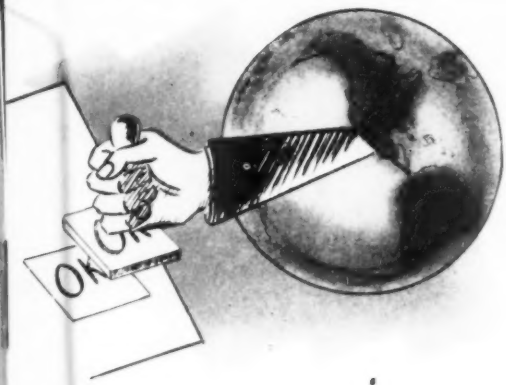
Mud Pumps, Shale Shaker Screens, Prospecting Rigs, Well Servicing Winches, Cementing Rigs and Oil Pumping Units . . . all require a bearing that can take it. And SKF Spherical Roller Bearings are preferred by designers. There's an SKF to meet every requirement. Call in our engineers. SKF Industries, Inc., Philadelphia 32, Pa.

6628

Oil Field Equipment Bearings engineered by SKF

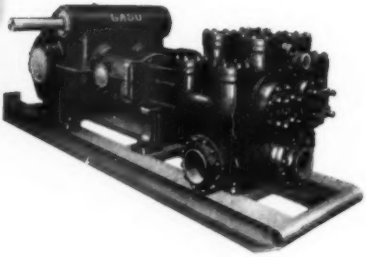
A 34 year record of leadership

+ a dramatic war record



+ worldwide acceptance

= positive assurance



of the utmost in
pumping satisfaction

Simple Arithmetic

ADDS UP TO-

GASO PUMPS
for every oil industry need

GASO PUMP & BURNER MFG. CO.

TULSA OKLAHOMA, U. S. A.

Export Office: 149 Broadway, New York. Shreveport and Odessa: W. L. Somner Co.
Los Angeles: Production Equipment Co. Inc. 651 E. Gage Ave.

Where WeldOlet is attached to run pipe, it tapers at proper angles, providing for a single bevel groove joint at the crotch section, blending into a V-butt joint at the ear portion.

The quickest — most economical — way to insure FULL PIPE STRENGTH AT BRANCH CONNECTIONS

WeldOlets*, with outlet sizes from ⅛" to 24", both straight and reducing, need no additional reinforcement to establish and fully maintain original strength on ASTM A-106 Seamless Steel Grade A Pipe, as set forth in Code for Pressure Piping, American Standards Association, B31.1-1942, and Supp. No. 2, B31.1b-1947. WeldOlet welding fittings provide the quickest, most economical, most *satisfactory* method of obtaining *full pipe strength* at branch connections. For detailed engineering reference data, write for Catalog W-2.

BONNEY FORGE & TOOL WORKS

FORGED FITTINGS DIVISION • 366 GREEN STREET • ALLENTOWN, PENNA.

Authorized Canadian Distributor: Sterling Steel Co., Ltd., 20 Temperance St., Toronto 1, Canada

MANUFACTURERS OF FAMOUS BONNEY TOOLS

Fig. 1—Cut-away view of reducing size WeldOlet with welding outlet in place. The external rib and wide bases or footings of WeldOlets* eliminate the need for *extra supports* to take care of bending or vibrational stresses at crotch section, the point of greatest stress.

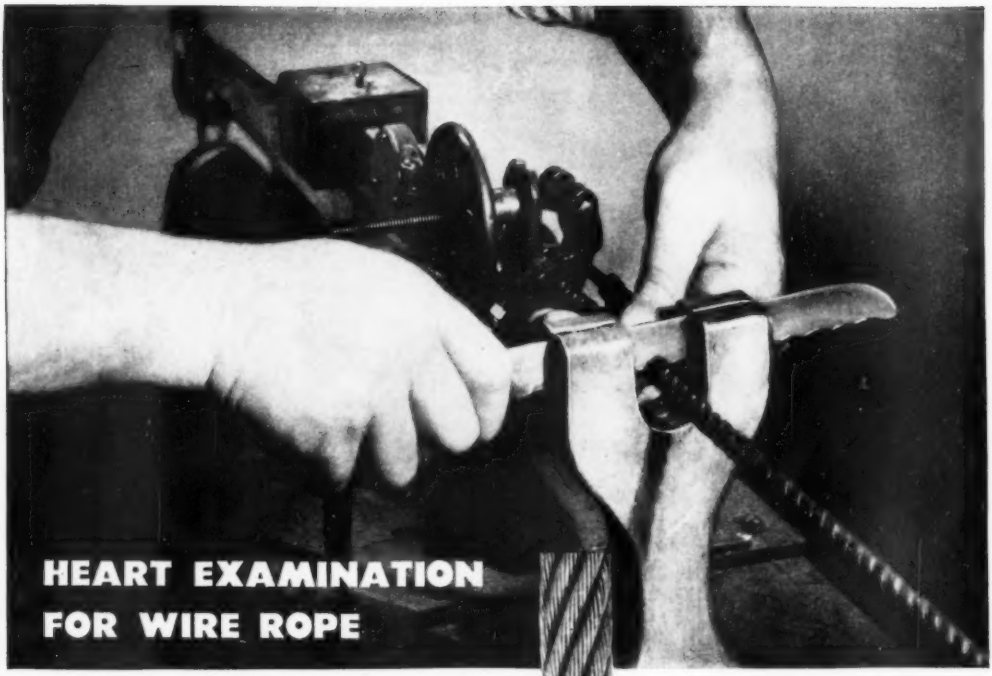
Fig. 2—Note blending of ear portion of welding fitting to run pipe. Extension of weld metal below inside scarfed portion of pipe insures all sections of joint greater than pipe wall thickness.

WELDOLETS

*Trade Mark Reg. U.S. Pat. Off. Pat. in U.S. & Foreign Countries

FOR WELDED BRANCH PIPE OUTLETS

When you want Bonney Welding Outlets, ask for WeldOlets*



HEART EXAMINATION FOR WIRE ROPE

The fiber core in the heart of wire rope serves a fourfold purpose. It acts as a support for the wire strands. It provides flexibility. It cushions impact loads. It stores lubricant and feeds it to the strands after the rope has been put in service.

Because of these important functions, the centers used in Wickwire Rope must pass exhaustive tests at the cordage manufacturer's plant and in Wickwire's Testing Laboratory. Centers must be made of the highest quality fiber; absolutely uniform in diameter, density and length of lay. The rope must be lubricated to the point of saturation and, where called for, an identifying marker tape must be spun into the rope.

Tough specifications? Sure! But so are scores of other tests made during the manufacture of Wickwire Rope. That's why more and more rope users are finding out that you can't beat Wickwire Rope for performance, safety and long rope life. And as for service—Wickwire Distributors and Wire Rope Engineers in key cities everywhere are ready to help solve your wire rope problems and to provide prompt delivery of Wickwire Rope from strategically located warehouse stocks. Wickwire Rope is available in all sizes and constructions, both regular lay and WISSCOLAY *Pr*eformed.

HOW TO REDUCE ROPE COSTS AND PROLONG ROPE LIFE

Thousands of wire rope users have found that the information packed in the pages of "Know Your Ropes" has made their work easier. It's full of suggestions on proper selection, application and usage of wire rope. It's easy-to-read and profusely illustrated. For your free copy, write—Wire Rope Sales Office, Wickwire Spencer Steel, Palmer, Mass.

WICKWIRE ROPE

CF&I — A SUBSIDIARIES

A PRODUCT OF THE WICKWIRE SPENCER STEEL DIVISION OF THE COLORADO FUEL AND IRON CORPORATION

WIRE ROPE SALES OFFICE AND PLANT — Palmer, Mass. **EXECUTIVE OFFICE** — 500 Fifth Avenue, New York 18, N. Y.

SALES OFFICES — Abilene (Tex.) • Boston • Buffalo • Chattanooga • Chicago • Denver • Detroit • Emlenton (Pa.) • Fort Worth • Houston • New York • Philadelphia • Tulsa

PACIFIC COAST SUBSIDIARY — The California Wire Cloth Corporation, Oakland 6, California

Canadian Power Project runs rings around its schedule

In mountain country, one hundred and thirty miles north of Vancouver, British Columbia Electric Co., has built a new hydroelectric plant. One thousand tons of water must be piped down a 41° mountain every minute! It called for a penstock (pipe lines) over 75" in diameter. Special pipe couplings had to be designed to withstand the pressures never before attempted at such diameters.

Dresser Manufacturing Division got the task because it specializes in solving difficult pipe joint problems. It can tackle with assurance what has never been done, because it is part of a large company with facilities covering every type of pipe line, for water, gas and oil as well as machinery, the pumps, compressors or blowers, at both ends.

The new couplings Dresser engineered, tested at 1,300 lbs. per sq. in. They reduced construction time from months to weeks and the job was completed months ahead of schedule. This sort of thing is why the Biggest Jobs Are Going to Dresser. Address inquiries about any aspect of pipe lines and penstocks to Dresser Industries, Inc., Cleveland, Ohio.

BOVAIRD & SEYFANG Mfg. Co.
Bradford, Pa.

CLARK Bros. Co., Inc.
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KOBE, Inc.
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PACIFIC Pumps, Inc.
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ROOTS-CONNERSVILLE Blower Corp.
Connersville, Ind.

SECURITY Engineering Co., Inc.
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STACEY BROS. Gas Construction Co.
Cincinnati, Ohio

Stacey-Dresser Engineering Division
Cleveland, Ohio

THE ONLY COMPANY **DOING AN OVER-ALL JOB—**

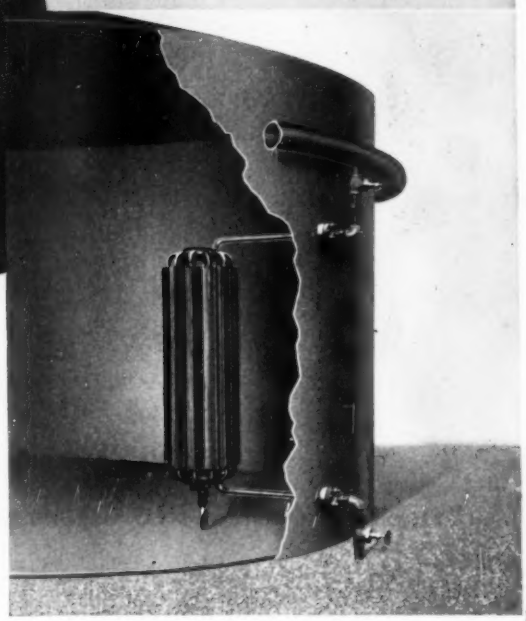
From well to refinery
for the Oil Industry—
From source to consumer
for the Gas Industry

DRESSER INDUSTRIES, INC.

TERMINAL TOWER • CLEVELAND 13, OHIO

THEY'RE *New -- Better, Cheaper and More Efficient*

BROWN FINTUBE *Thermo-Flo* TANK HEATERS



● Brown Fintube THERMO-FLO Tank Heaters are service proved — and offer many advantages as compared to the old method of using a bare pipe coil on the bottom of the tank.

EASY INSTALLATION—THERMO-FLO heaters are compact units. They will pass through a standard 20 inch manway with ample clearance.

REDUCED FOULING—The vertical mounting practically eliminates depositing on the tubes, and avoids the necessity of heating through a layer of sediment.

EFFICIENT HEAT TRANSFER—THERMO-FLO heaters set up a thermal siphon or "flow" within the tank, resulting in highly efficient heat transfer — and avoiding stratification.

LOW VOLUME DISPLACEMENT—Due to Brown's exclusive finned tube construction, each lineal foot of fintube in the THERMO-FLO heater has the surface equivalent of 6 lineal feet of plain bare pipe.

STURDY CONSTRUCTION—THERMO-FLO heaters are built to a standard design — in low cost production quantities — and are completely assembled and tested before shipment.

INEXPENSIVE—Users report that the cost of a group of Brown Fintube THERMO-FLO heaters — plus their installation — is *less* than just the installation of a bare pipe coil having equivalent heating capacity.

EASY MAINTENANCE—THERMO-FLO heaters can be removed from the tank easily and repaired or cleaned *outside* the tank,— or a damaged heater can be replaced with another standard heater from stock.

HIGHLY FLEXIBLE—THERMO-FLO heaters can be installed in new or existing tankage and additional units can be added to meet changing conditions.

MEET ANY REQUIREMENT—THERMO-FLO heaters can be installed singly or in groups. Fabricated from mild steel, stainless steel, monel, everdur, admiralty or other metals, to meet individual conditions.

Bulletin No. 491 Gives Full Details.
Write for a copy. Today!

THE BROWN FINTUBE CO.
ELYRIA, OHIO

FINTUBE HEAT TRANSFER PRODUCTS

LET US PROVE YOU CAN SAVE MONEY IN SHALLOW DRILLING AND WELL WORKOVER with the BREWSTER N-3 RIG

PORTABLE

Extreme portability makes the Brewster N-3 Rig ideal for 3500' drilling and 7500' servicing work. Easy to move — fast to rig up.

COMPACT

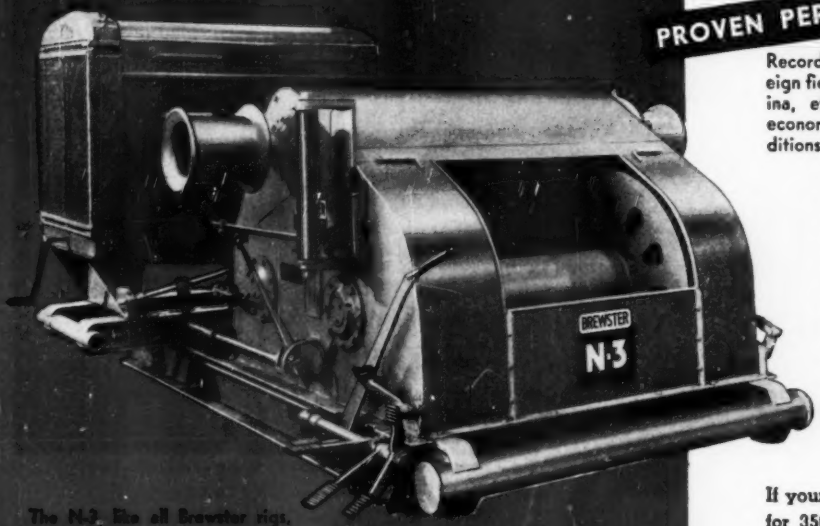
The N-3 is unitized on a single skid, with all controls located at driller's position. N-3 Rig is also built in double drum model.

ECONOMICAL

Ease and speed of operation of the N-3 assures maximum drilling economy. Precision construction means low maintenance costs, longer service life.

PROVEN PERFORMANCE

Records from domestic and foreign fields prove the N-3's stamina, efficiency, and operating economy under all drilling conditions.



The N-3, like all Brewster rigs, has the benefit of 24-hour field service anywhere in the U. S. phone call will bring a service expert or repair parts immediately.

THE N-3 TEAM OF MATCHED DRILLING EQUIPMENT

consists of the N-3 Rig, the OB-12-L Rotary, the 3-S Oilbath Swivel, and the H-50 Block. The N-3 Team has been engineered to provide the maximum efficiency and economy in 3500' drilling.

If your drilling program calls for 3500' drilling, well workover, or servicing operations, it'll pay you to investigate the Brewster N-3 Rig. Write for complete information today.

THE BREWSTER CO., Inc.
SHREVEPORT, LA.

Brewster Drilling Equipment is sold by:

APEX EQUIPMENT CO.
BOYAIRD SUPPLY CO.
INDUSTRIAL SUPPLY CO.
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BACKED BY 24-HOUR BREWSTER SERVICE

BREWSTER MATCHED Drilling Equipment

PERFORMANCE-PROVEN WITH OIL MEN

IN THE TOUGH SPOTS, rope with an Independent Wire Rope Core gives best and longest service! I.W.R.C. is outstanding where operating pressures are high; where heat resistance, additional strength, or minimum stretch are essential. But remember this . . . *the same features that make* I.W.R.C. *best for the tough spots help make it the longest-performing and most economical specification for a wide range of applications!*

As rotary drilling lines, Roebling 6 x 19 Preformed "Blue Center" Steel Wire Rope with I.W.R.C. has demonstrated *extra* life on the job and substantial dollar savings. And, of course, Roebling Preformed construction brings greater ease of handling, top flexibility, less tendency to kink or foul.

Have your Roebling Field Man help select the *right* rope for your special requirements. John A. Roebling's Sons Company, Trenton 2, New Jersey.

Distributed by: **The National Supply Company**
Republic Supply Company

ROEBLING

☆ *A CENTURY OF CONFIDENCE* ☆

● Experimental laboratory condenser, with water boxes removed, designed by The American Brass Company and tubed with eight different copper alloys, as it appeared after 10-month test, July 28, 1947 to May 25, 1948, at the Marine Test Station of International Nickel Co., at Kure Beach, N. C. *(see above).*

ANACONDA Cupro-Nickel 754

(10 PERCENT NICKEL CONDENSER TUBE)

MANUFACTURED AND SOLD UNDER U. S. PATENT NO. 2,074,604

Shows High Resistance Under Accelerated Test

TEN months of testing with high velocity sea water at Kure Beach, N. C., demonstrate the superiority of Anaconda Cupro-Nickel 754 (nominal composition, copper 89.25 percent, nickel 10 percent, iron .75 percent) over a number of widely used condenser tube alloys.

The purpose of the test was to determine the resistance of various standard tube alloys to corrosion-erosion type of deterioration caused by turbulent flow of sea water. The tubes are .625″ O. D., 18 gage (.049″), and 61 inches long. The average velocity of sea water flowing through the tubes, during the continuous 10-month test, was 11.7 feet per second. Water temperature varied from 45°F. to 85°F., according to the season of the year.

This test, and performance records where Cupro-Nickel 754 tubes have been in service under severe operating conditions, indicate that this tube and tube sheet alloy will give economical service for central station and marine condensers handling clean and some types of polluted sea waters. The American Brass Company welcomes opportunities to discuss problems relating to condenser tubes, and the services of its Technical Department are available for assistance in selecting alloys to meet specific operating conditions.

ANACONDA

Anaconda

CONDENSER TUBES

THE AMERICAN BRASS COMPANY

General Offices: Waterbury 88, Connecticut

Subsidiary of Anaconda Copper Mining Company

In Canada: ANACONDA AMERICAN BRASS LTD., *New Toronto, Ont.*

HEAVY-DUTY for STEADY OUTPUT .

Koehring 205 also handles ½-yard shovel or hoe dipper . . . ¾-to . . . Mounts on heavy-duty crawlers, or on pneumatic tires for truck or cruiser service. Other Koehring sizes: ¾-yard 304 . . . 1½-yard 605 . . . 2½-yard 1005. Whatever size or type you need, your local Koehring distributor has the lowest-cost answer . . . see him soon.

KOEHRING HEAVY DUTY

KOEHRING COMPANY
MILWAUKEE 10, WIS.

Subsidiaries: KWIK-MIX • PARSONS • JOHNSON

. . HIGH-SPEED for FAST SCHEDULES

PARSONS MODEL 250 TRENCHLINER SETS FAST PIPELINE PACE

Here's a high-speed pipeline trencher that can set a fast schedule for your crew. Rugged Parsons 250 ladder-type Trenchliner has 30 digging speeds from 2.5 inches to 11.3 feet per minute . . . provides maximum digging efficiency in any type of material short of solid rock. It digs 16 to 42 inches wide, up to 12½ feet deep . . . produces clean, smooth-walled trenches that are ready for pipe. No extra, costly hand trimming necessary.

Production stays high, costs low because of these Parsons heavy-duty features: Arch-type frame rigidly supports telescopic digging boom . . . keeps boom precision-aligned for accurate grading. On uneven terrain, oscillating 3-point suspension mounting keeps entire machine on an even keel . . . keeps twists and strains from main frame . . . assures uniform ground pressure. In toughest digging, safety overload clutch cushions shock loads, protects operating machinery from abnormal strains. All main gears are fully enclosed, run in continuous oil-tight bath . . . assure steady, trouble-free performance day after day.

Ask your nearest Parsons oil field distributor for all the facts on what this 250 ladder-type Trenchliner can do for you. He has complete information, too, on the smaller Model 221 crawler-mounted Trenchliner, and the big Model 310 for heaviest duty digging. Ask, too, about the new utility-size Model 80 Trenchmobile on rubber tires, for extra speed and lower costs on your small pipeline excavations. It will pay you to call your Parsons distributor today.

PARSONS COMPANY
NEWTON, IOWA
KOEHRING SUBSIDIARY

KOEHRING PRODUCT

KP924 *TRADEMARK REG U S PAT OFF

PETROLEUM EQUIPMENT

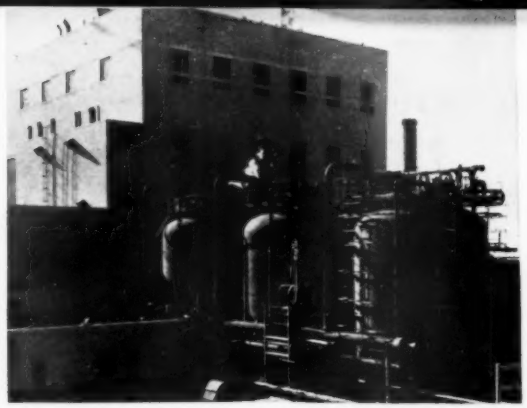
"Buying Guide"

FOR FIELD, REFINERY, TRANSPORTATION

Need help for *new building — modernizing — expanding?* Get *practical, down-to-earth* buying assistance from Allis-Chalmers oil industry specialists, who *know* petroleum equipment needs!

And be *assured* of *unbiased recommendation* because you choose from the world's *widest range* of electric power and mechanical processing equipment!

A-C specialists are as near as your phone. Call your A-C Office or write ALLIS-CHALMERS, MILWAUKEE 1, WIS.



Operation of Large Hot Process Units for Silica Control

AUTOMATIC proportioners release chemicals according to the inflow of raw water as measured by orifice-type meters. Agitators in the chemical and sedimentation tanks assure a thorough mixture.

Raw water is first treated in the lime-soda unit to reduce silica content and hardness to a specified value. Then the phosphate unit reduces the hardness to zero. Pressure filters clarify the effluent. Facilities for sludge recirculation and for backwashing the filtering medium are also included.

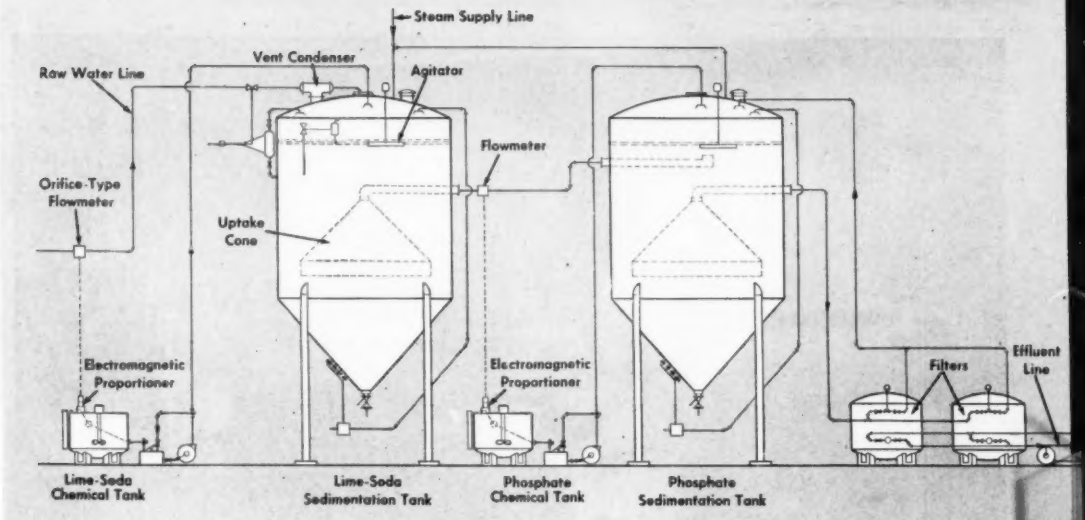
When extended, this Allis-Chalmers hot process system will consist of six sedimentation tanks, twenty-four filter tanks, and allied mixing tanks, proportioners and control.

CENTRAL PANEL contains control for all chemical proportioning and feeding mechanisms and pumps, flow recorders, pressure gauges, and other necessary instruments.

This 10,000-KW Allis-Chalmers topping turbine is one of the units on the down side of the boilers. The turbine exhausts steam at 450 psig to a series of smaller turbines. In this way a high pressure system is superimposed on a previously installed low pressure superimposed system to supply electric power and steam throughout the refinery.

ALLIS-

Power, Electrical, Processing,



Allis-Chalmers Water Conditioning Treats 100% Makeup for Three 1350-psig, 900-degree Boilers!

THIRD UNIT ON ORDER FOR LARGE REFINERY WILL INCREASE CAPACITY FROM 160,000 TO 240,000 GALLONS PER HOUR!

AT THIS MIDWEST refinery raw water is treated for what are perhaps the *severest* boiler conditions in the petroleum industry.

Before the feedwater enters the boilers, Allis-Chalmers hot lime-soda and phosphate units reduce hardness to zero and silica content to considerably less than 1 ppm to prevent scale formation in boiler tubes and silica deposits on turbine blading.

At this refinery, Allis-Chalmers has proved its ability to solve the toughest water conditioning problems in the petroleum industry by providing a system that automatically maintains the desired feedwater properties within safe limits.

Let Allis-Chalmers go over your water conditioning needs with you. Check at right how Allis-Chalmers is equipped to supply *unbiased* recommendations for a sound system to solve water treatment problems. Call your nearby A-C sales office for qualified water conditioning advice. Or write direct.

A-2688

ALLIS-CHALMERS, 1059A SO. 70 ST.
MILWAUKEE, WIS.

FOR UNBIASED RECOMMENDATIONS, CHECK A-C WATER CONDITIONING:

SERVICE includes complete analysis of water supplies; reports on water-steam cycle; study of present equipment; advice on selection of chemicals; periodic reports and service calls.

CHEMICALS — Scale inhibitors for all heat exchange cycles. Special chemicals to prevent boiler scale, control corrosion, reduce silica, and correctly condition sludge.

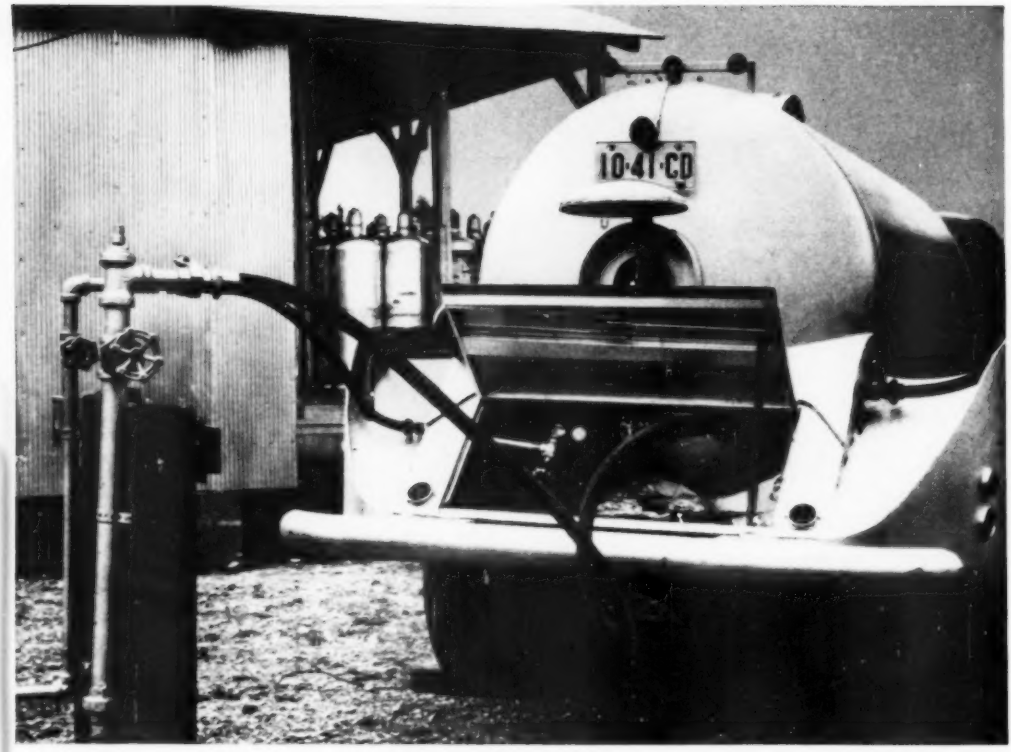
EQUIPMENT Hot and cold process softeners; sodium and hydrogen zeolite softeners; degasifiers; deionizers; chemical proportioners; oil removal and water filters.

Get the Complete Story —
ASK FOR DESCRIPTIVE BULLETINS!

CHALMERS

and General Machinery for the Petroleum Industry

A-C ALLIS-CHALMERS



This hose "works under pressure"

The hose in this picture makes it easy for you to give fast, safe LP-Gas service to people who live or work beyond the city gas mains.

It's Hewitt Propane-Butane Hose—made especially for safe handling of LP-Gas. Because of its unique design and construction you can depend on it *to withstand several times the pressures set up by LP-Gas.*

Reason enough why Hewitt Propane-Butane Hose lasts longer! Reason, too, why you can use it in severe service without fear of breakdowns!

Yes . . . you can count on this dependable hose for fast, safe movement of LP-Gas—from bulk storage to tank cars . . . to cylinders . . . and from tank trucks to your customers' domestic, commercial and industrial storage tanks.

Remember . . . Hewitt Propane-Butane Hose is only one of many types of hose manufactured by Hewitt Rubber especially for the petroleum industry. You can also get Hewitt Gasoline Pump Hose, Tank Truck Hose, Oil Suction and Discharge Hose and many others.

Why not plan now to use Hewitt Propane-Butane Hose in *your* LP service? Call your Hewitt distributor listed in your phone book. Or write Hewitt Rubber Division, 240 Kensington Ave., Buffalo 5, New York.

HEWITT

Propane-Butane Hose

HEWITT RUBBER DIVISION

Why you can depend on Hewitt Propane-Butane Hose for safe, speedy service

1. Resists penetration. Special non-porous synthetic tube resists penetration by LP-Gases.

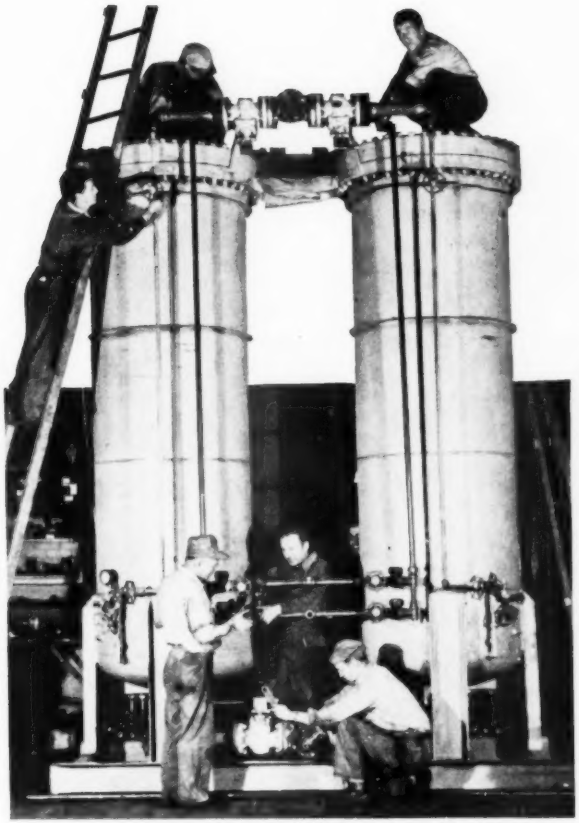
2. Withstands high pressure. Close-woven duck plies bonded together to stand up under extreme pressure.

3. Dissipates static. Spiral of wire imbedded in wall for static dissipation. Factory-tested for positive electrical connection.

4. Easy to handle. In spite of its unusual strength, Hewitt-Propane-Butane Hose is flexible, light in weight.

5. Long lasting. Weather-resistant cover reinforced by strong, open-weave fabric to withstand dragging over rough ground.

HEWITT-ROBINS HR **INCORPORATED**



DRYing is BIG business

Six men finished this Type BWC-3500 Lectrodryer in a hurry. An oil company needed it for propane drying.

Lectrodryers come in small sizes, too. This is the Laboratory Model.

Hundreds of Lectrodryers of all sizes are working for the Petroleum Industry—DRYing gas to avoid freeze-ups in pipe lines, DRYing compressed air supplied to instruments controlling refining processes, DRYing materials to keep sensitive reactions on the beam, DRYing warehouses to prevent spoilage of products in storage.

DRYing has also become BIG business in other industries. Hundreds of air-drying Lectrodryers are installed in Navy ships, holding humidities at 30° relative humidity to prevent deterioration of materiel. Chemical manufacturers DRY the atmosphere in which they work, the materials entering into their processes, and the rooms in which finished products are stored.

Are you having trouble with unwanted moisture? Tell us *where* and we'll tell you *how* to solve it. Pittsburgh Lectrodryer Corporation, 325 32nd Street, Pittsburgh 30, Pennsylvania.

In England: Birlec, Limited, Tyburn Road, Erdington, Birmingham.
In Australia: Birlec, Limited, 51 Parramatta Road, Glebe, Sidney.

LECTRODRYERS DRY WITH ACTIVATED ALUMINAS

LECTRODRYER

REGISTERED TRADEMARK U.S. PAT. OFF.

How George and Jean won $2,000 college scholarships

These two young Westerners, Jean Hathaway of Chico, California, and George Emde, Jr. of Lodi, California, will begin college next fall with the help of $2,000 scholarships awarded by Standard of California.

They were chosen as outstanding among 4-H Club and Future Farmers of America members who raised and showed their own livestock at the recent Grand National Junior Livestock Exposition in San Francisco. Four other scholarships of $1,000 each were also awarded—to Mary Lee Hay of Lovelock, Nevada; Robert Young of Quincy, California; Ralph Boyd of Lancaster, California; and James Buell of Buellton, California.

Scholastic ability, leadership, personality, records in club projects were all considered by 4-H Club and F. F. A. judges.

We'd like to say "Good Luck!" to George, Jean, Mary, Robert, Ralph and James. We know they'll do a fine job in school...and later as good citizens of the West.

STANDARD OF CALIFORNIA
plans ahead to serve you better

Standard Oil Company of California

POUNDS OR TONS — AS HANDY AS YOUR TELEPHONE

ONE CALL SERVICE FOR ON-CALL METALS

To supply the specialized needs of the petroleum industry for corrosion-resistant stainless steels and stainless steel products, your Metal Goods warehouse carries a large stock of these essential specialty metals. Many different grades and types can now be furnished from stock—without delay. A few of these are:

***Type 316* for higher corrosion resistance under reducing conditions.**
***Types 321 and 347* for welding applications.**
***Type 410* in strip and sheet for vessel linings.**

Sheets • Plates • Bars • Tubes • Castings • Fittings

We also stock the accessories you'll need to complete your job:
Welding Rod • Nuts • Bolts • Studs • Rivets, etc.

Types for special applications, although not normally stocked in warehouses, can also be supplied by us at no extra cost.

Metal Goods warehouses are strategically located in the heart of the Midwest and Gulf Coast refining industry — ready to serve you quickly and dependably.

Monel* • Nickel* • Inconel* • Aluminum • Brass • Copper

Plus complete stocks of condenser and heat exchanger tubes... Admiralty... Alclad Aluminum... 70/30 Super-Nickel... Monel.

Tube Sheets... Naval Brass... Muntz Metal

*Not Warehoused in Kansas City or St. Louis **Fittings and Accessories**

Consult your Metal Goods metallurgical specialist on the proper metal for your application.

Phone, wire or write your Metal Goods warehouse for your specialized metal needs. Do you have your "Metalog"? It's a complete stock list and metal manual. Write for it!

MGC

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Here's the Lightweight ... YOU'VE BEEN WAITING FOR!

FRONTIER ALUMINUM WRENCH

LIGHT WEIGHT

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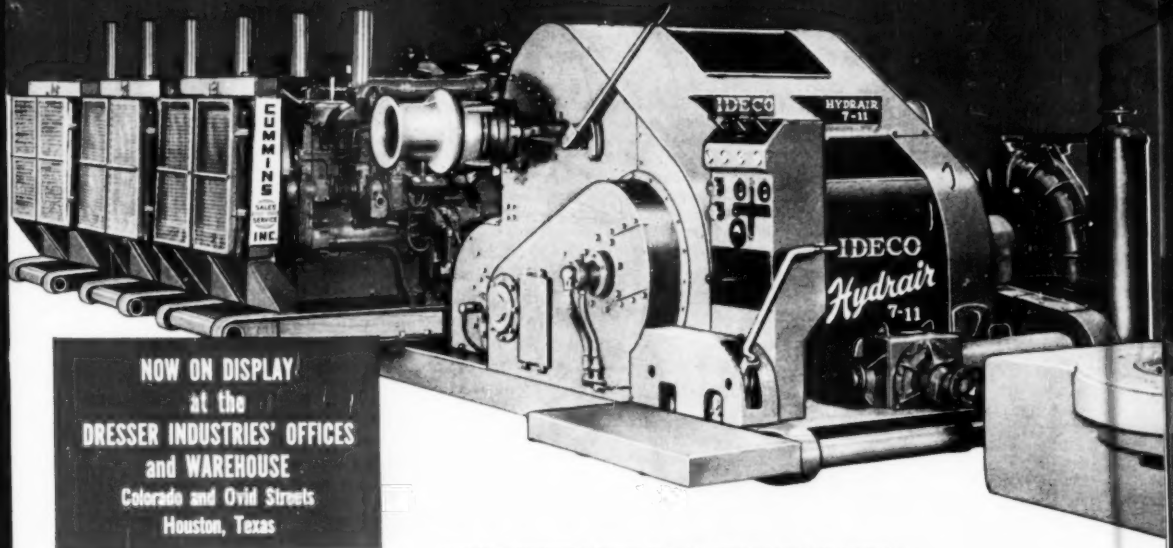

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JOURNALLY Speaking

Working on the Levy

DOWN Louisiana way the oil men are working hard to get modification of the high tax levied on retail gasoline sales in the Pelican state. The state tax is now 9 cents, and with the added federal levy of 1½ cents per gallon the total is equivalent to a sales tax of 57 per cent.

One of their devices is "Black Tuesday" on June 7, the first anniversary of the effective date of the increased state tax. On that day all filling stations are to be draped in black crepe, and customers will be handed cards of sympathy. It usually takes more than mourning to get a tax repealed, but if this Louisiana stunt proves effective we would like to have the national concession for black crepe.

The Greeks Have a Word

THE Greeks have a word for appreciation, and it is embodied in the careers of William G. Helis, pater et fils, outstanding independent oil producers of Louisiana.

A generation ago Helis, Senior, arrived from Greece and was fired by the opportunities for wildcatting in Louisiana and East Texas. After some minor successes and failures he had a wonderful hunch but a slim purse. But his Greek friends in New Orleans had faith in him and raised a grubstake. He made money for all of them, but his appreciation didn't stop there. He went back to Greece to start oil development on the American, not the nationalistic, pattern. The war interrupted his plans, but he is now set to try again.

Meanwhile Bill, Junior, still under 35, has become one of South Louisiana's most enterprising and most prominent business men. He has made several offshore oil discoveries and has large fisheries and other local interests. To show his appreciation for the region where opportunity smiled so benignly, Bill takes the lead in all New Orleans civic enterprises.

As a vice president of the Independent Petroleum Association of America, he was its host at its New Orleans meeting, and the way he fulfilled both duties left no doubt of his appreciation of the spirit of self-reliance and enterprise which have always been the hallmark of the independent oil man.

Accurate Reporter

BOB HARWICK, our new West Coast editor, is getting off to a good start with his colleagues by establishing a reputation for perspicacity.

During the A.P.I. regional meeting in Los Angeles the boys at the press table amused themselves by getting up a pool on the number of people in the hall. Bob guessed 1,023. When the count was taken it tallied exactly 1,023, and our boy Harwick picked up the dough. Typical of the alertness of all Journal staff men, of course.

Radiant Prospect

CHARLES F. KETTERING, General Motors' versatile and optimistic researcher, says we ought not to worry over the probability that the earth's supply of fossil fuels will be used up in only 3,500 years, because the sun sends us that much energy in just 5 weeks. All we have to do, says Kett, is to figure out some way to harness this radiant energy, and the fears of an oil shortage will be ended forever.

We will add our own prediction that when this discovery is made, the then secretary of the interior will ask for huge appropriations to build government plants on the theory that private industry won't be able to get into production before the oil runs out.

Nothing Safe

OUR exchange editor, who has nothing much to do but read the newspapers, clipped out an item about burglars blowing an oil man's safe and making off with $400 and his clothes. You can lose your shirt in the oil business even when you lock it up in a safe.

—Henry D. Ralph

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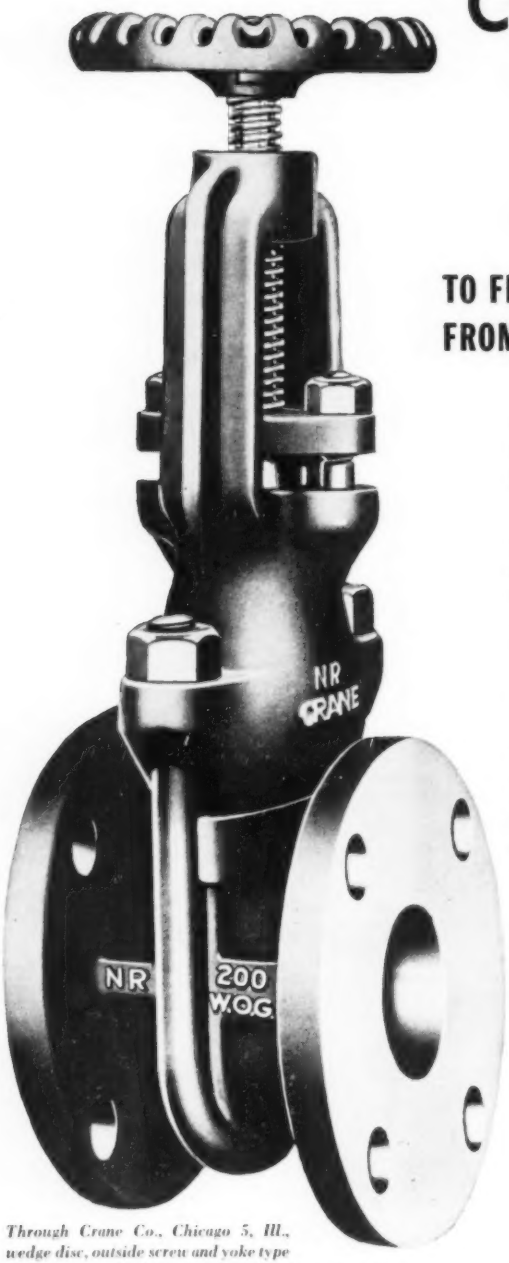

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In This Issue

News

Imperial Planning Crude Line From Alberta to Great Lakes 38
Fuel-Oil Reseller Given Price-Cut Guarantees 38
Freedom From Controls Means Lower Prices, A.P.I. Men Told 39
Federal Law Limiting Imports Needed, House Committee Hears 40
Advantages of Cold Rubber Are Outlined at Plant Opening 42
Efforts Toward Compromise on Tidelands to Come to Head Soon 43
Gasoline-Tax Collections Show First Postwar Downward Dip 44
Granting of New Concessions in Venezuela Being Considered 111
Schoonebeek Field Now Producing 11,300 Bbl. Daily 112
Danciger Refinery to Leave Houston for Reerection in Sicily 118
Tierra del Fuego Well Claimed by Argentina 118
Olds Opposes Gas Act Changes in Hearing on Kerr-Thomas Bill 121
1,000-Mile Oil Change Upheld by A.P.I. 124
Plans for Oil Search in Okefenokee Area Opposed 125

Engineering-Operating

Case History of a Gas-Injection Project 48
Streamlined Coordination Accomplished 52
Basic Interpretation of X-Ray Photographs of Pipe-Line Welding 55
A.B.C.'s of Lubricating Greases 58
Questions on Technology 69
Underground Storage of Propane-Air and Natural-Gas Mixtures 70
Problems and Methods of Contract Drilling 73
Engineering Fundamentals—The Jamin Effect 79
Cost-imating—Filter-Press Costs (Petrochemical) 81

Exploration-Development

D3 Production in Alberta Extended 90 Miles S.E. 95
Highlights of Week's Developments 95
Reports by Areas Start on Page 96

Departments

Journally Speaking 33
Editorial 37
This Week 41
Personals 45
Deaths in the Industry 47
Pipe-Line News 83
Refining News 88
Natural-Gas News 91
Drilling Contractors 92
Running High 93
International News 111
Watching Washington 122
Exploration Statistics 126
Production Statistics 127
Refining Statistics 128
Market Statistics 129
Equipment Men in News 131
Classified Advertising 132
Calendar of Events 136
Advertisers' Index 136

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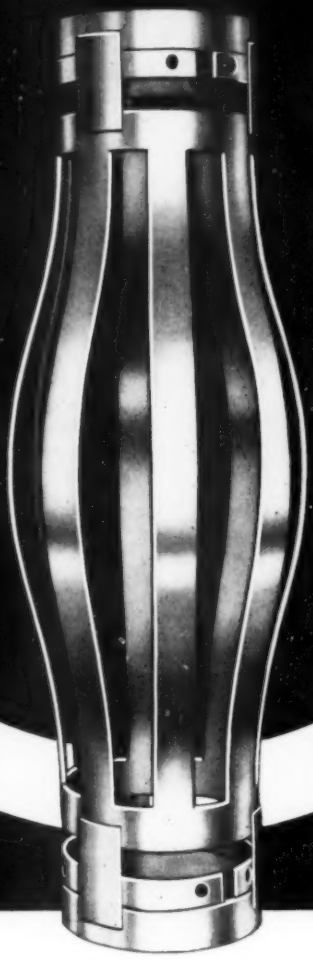

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THE OIL AND GAS JOURNAL

Tidelands Compromise

REPORTS from Washington and comments of Texas and Louisiana press and political leaders reveal that consideration is being given in some quarters to a possible compromise in the state-federal tidelands controversy. This development apparently stems from a feeling on both sides that half a loaf is better than none.

A stalemate appears to have been reached in Congress relative to the administration proposal to implement the Supreme Court decision of 2 years ago which gave the California tidelands to the federal Government. The same situation exists in the case of the more strongly supported measure which would reestablish state ownership by statute.

There is a third party involved in this matter, and that is the oil industry. Federal and state interests may work out an agreement that is mutually satisfactory and then wake up to the fact that operators will not be interested in risking further capital in the development of additional offshore oil.

No operator can justify participating in this new and costly operation if he is going to be circumscribed by restrictive regulations or by the divided authority of state and federal regulations. One suggested plan is to acknowledge state ownership to an agreed distance off shore with the rights of the federal Government paramount from that point to the edge of the Continental Shelf. This arrangement might easily develop into a situation which would stop development after the oil has been found.

It is agreed that past experience shows that state officials have a better appreciation of what is required to find and develop oil properties. Their regulations pertaining to state lands have paralleled those applying to private lands. On a basis of what has happened in the past, operators are justified in being suspicious of the federal attitude. There is a fear that in the case of the tidelands the military viewpoint would become dominant at Washington and all operations would be largely on a basis of hoarding for a possible national emergency.

This won't work. Two wars have demonstrated that national security as regards petroleum lies in full-scale operations so that output can be expanded rapidly if needed to support a war.

In the case of the tidelands this means not only finding the oil and drilling development wells but providing for costly transportation and other facilities of a complete producing operation. This obviously can be accomplished only if producers are permitted to carry on tidelands operations as they do land activities.

With this background we strongly urge that when and if the tideland compromise passes the talking stage that state and federal officials call on representative operators to guide them in their deliberations. Otherwise the oil possibilities of the tidelands, which brought about the federal suit to determine ownership, will never be known.

Imperial Planning Crude Line From Alberta to Great Lakes

by Charles J. Deegan

CALGARY.—Construction of a pipe line from Alberta to some point on the Great Lakes to move crude oil to markets in eastern Canada and probably also in the United States is being given active consideration by Imperial Oil, Ltd.

Announcement of the project was made by H. H. Hewetson, chairman of the board of Imperial, in a speech before the Regina Chamber of Commerce last week. Probable size of the line, location of its terminus, and the volume of crude which may be brought into the United States have not yet been worked out, he indicated.

Imperial is now planning to build a 16-in. crude line from Edmonton, Alta., to Regina, Sask., a distance of 450 miles. Final authorization for this line has not yet been received, but plans call for start of construction late this year and completion in 1950. The projected new line would be an extension of this Edmonton-Regina line. It is approximately 750 miles from Regina to the nearest point on Lake Superior.

Crude Market Saturated

Hewetson pointed out that development of discoveries to date in Alberta already has saturated the crude market economically available by current methods of transportation, and additional development drilling is bringing in new wells constantly at a time when the wells already producing are on restricted production rates. While this is building up potential production, he noted, it is not adding to current production, as no more oil is going to market because the requirements of the western refineries are satisfied.

"It seems in such a situation it would be much more sensible to use our available capital to provide further outlets for crude in a logical market than to use the money for premature drilling," he said.

"It is important that we proceed in an effective manner, both with regard to the heavy financial burdens and the equities involved, so that we can establish ourselves in a competitive position to supply eastern markets along the Great Lakes in Canada and, in due course, similar United States markets.

"The only way to accomplish this is by the construction and use of a pipe-line extension from Regina to lakehead. The pipe line would provide a means for the producers generally to participate in available business in the new areas that would then be brought within reach."

Hewetson's reference to the possibility that the pipe line would make Canadian prairie oil competitive in eastern Canadian markets and also "in due course, similar United States markets" was amplified by Imperial officials in a special statement to The Oil and Gas Journal. This statement said:

To Supply Eastern Market

"Canadian imports of petroleum from the United States in 1948 were 140,000 bbl. per day. The purpose of a pipe line to the head of the lakes is to supply eastern markets along the Great Lakes in Canada, as indicated in the speech.

"In due course it would be logical that Canada move crude to some nearby extraterritorial markets and thereby permit continuance of crude deliveries to other areas of Canada through established channels instead of attempting to supply larger Canadian markets by further investment of capital to provide additional transportation. As for the exact terminal of the projected pipe line at the head of the lakes, it is impossible at this time to indicate what this might be as the project is still in exploratory engineering stages."

Speculation over the possible route of the line and the method of operating it raised the possibility that it might be brought to some United States port instead of to the Canadian shore of Lake Superior. This might take the line through terrain where construction would be easier. Crude could be moved through United States territory under customs bond, as is done with the Portland - Montreal pipe line. The crude would then be moved by lake tanker to the Canadian refining center of Sarnia at the foot of Lake Huron north of Detroit.

It was further speculated that eventually Imperial might consider extending the line into the Midwest area of the United States where it could connect with pipe lines now moving Mid-Continent crude to Sarnia. In such a case Alberta crude could reach eastern Canadian markets entirely by pipe line, or it could be traded for American crude in the Midwest. This would obviate the necessity of suspending crude shipments during the winter when the Great Lakes are closed to navigation.

Fuel-Oil Resellers Given Price-Cut Guarantees

A GUARANTEE to fuel-oil resellers that they will not lose money if they stock up now was announced last week by Esso Standard Oil Co.

The announcement made it possible also for resellers to assure home owners in a similar manner they would not be penalized by later price cuts if they should fill their home storage early.

In a company statement, M. J. Rathbone, Esso president, said resellers who buy No. 2 heating oil during the summer months will be billed at the current posted price. If the posted price between the date of delivery and September 1 should drop, an adjustment will be made, he said.

"The purpose of this policy," Rathbone said, "is to encourage the use of all available storage facilities and to promote the movement of heating oil to the place of consumption during the summer season.

"In order to provide the requirements of the heating season, the oil-refining industry must manufacture No. 2 heating oil throughout the year. If the interests of the consuming public are to be adequately protected, oil must be moved in the off-season into consumer's and reseller's storage. This movement is not taking place at a satisfactory rate.

"Our policy," he continued, "has been adopted to give the resellers of our heating oil assurance against the financial loss they might incur in the event of a decline in our price and to increase the flow of products which is essential if we are to meet the demands of next winter."

The company said that for southern areas the policy would be in effect until October 1.

Alberta Legislature Will Act on Gas Export Policy

A special session of the Alberta legislature probably will be called for July 4 to determine the policy of the provincial government toward export of natural gas to other provinces and to the United States.

The Dominion Government in Ottawa has indicated that its stand on gas exports will be made known after the provincial government's program has been reviewed by the attorney general's department. The Canadian House of Commons already has approved private bills incorporating five companies which propose to build pipe lines to move natural gas out of Alberta. These are Westcoast Transmission Co., Trans-Northern Pipe Line Co., British American Pipe Line Co., Western Pipe Lines, and Interprovincial Pipe Line Co.

Freedom From Controls Means Lower Prices, A.P.I. Men Told

by Roy F. Carlson

CASPER.—The present situation in the petroleum industry is proof that economic laws operating in a free-enterprise system give consumers more products at lower prices than any system of government controls could provide, Samuel B. Pettingill, of the legal staff of Pure Oil Co., Chicago, declared in the feature address of the Rocky Mountain district, American Petroleum Institute Division of Production here May 26-27.

"In a rapidly expanding industry, such as petroleum, the effect of economic law may be, at times, obscured but it is always exerting its force," declared Pettingill, a former member of Congress and well known as a newspaper columnist and radio commentator.

"The first commandment of economics is that when the price of a commodity rises in a free market in response to demand and supply, production or supply increases, consumption or demand decreases, and the use of substitutes rises. When price falls, production decreases, consumption increases, and the use of substitutes declines. Price thus allocates existing supply to its most economic use. It is the automatic, self-correcting regulator of the economic engine—more reliable, more impartial, more beneficial and less costly than the promises or performances of power-drunk politicians."

Pettingill was introduced to the more than 300 oil men present by James C. Johnston, division production manager for Continental Oil Co. and chairman of the district, who also pointed to the success of the A.P.I. Production Division in aiding Rocky Mountain oil men through standardization of methods, introduction of new methods and "furnishing a clearing house and forum for getting together and exchanging ideas."

Officers Elected

At the election of officers, Zach K. Brinkerhoff, Jr., Brinkerhoff Drilling Co., Casper, was made chairman for the district; C. L. Larson, Stanolind Oil & Gas Co., Casper, vice chairman for Wyoming; C. L. Pickett, The California Co., Denver, vice chairman for Colorado; W. M. Saxon, Pure Oil Co., Billings, vice chairman for Montana; C. E. Peavy, Phillips Petroleum Co., Salt Lake City, vice chairman for Utah; and D. T. Hoenshell, General Petroleum Corp., Casper, secretary-treasurer. Johnston was named chairman of the advisory committee.

R. L. Wheelock, of Wheelock & Collins, Corsicana, Tex., and vice president of the A.P.I. Division of Production, called attention to the progress made during recent years in the Rocky Mountain region. He said the Superior Oil Co. Pacific Creek, Wyo., wildcat, now drilling below 19,870 ft., shows the cooperative spirit required for oil development, plus the high costs of finding oil.

Deep Producer Discussed

In addition to the regular committee sessions to discuss secondary recovery methods, drilling practice, and drilling fluids, several important technical papers were presented at the meeting. L. L. McDonald, Pure Oil Co., Billings, presented a paper on "Drilling and Completion Problems Relating to West Poison Spider, Wyoming, Discovery Well." This well was until recently the deepest producing well in the world, with production from the Frontier formation at 14,309 ft., total depth. McDonald pointed out that "the successful completion of this well is one more demonstration of the industry's progress and its ability to find and produce oil from a deep horizon that was inaccessible a few years ago due to equipment limitations." A total rig time of 346 days was required, from rigging up to moving off on the well, and little time was lost in fishing or lost-circulation difficulties. McDonald presented a complete picture of the drilling progress and completion of the wildcat.

M. R. McArthur, Husky Refining Co., Cody, gave an interesting history of oil development in western Canada. Several Canadian oil operators flew to Casper to attend the 2-day A.P.I. meeting, and due to the increased activity in the area McArthur's paper was considered very timely. In discussing the future of the area McArthur said: "With more drilling rigs coming in, more new discoveries being made, and an increasing number of development wells completed, it is very evident that the normal market of the area and the transportation now available and planned will be inadequate. This is going to call again for further proration and somewhere along the line may even effect the western Canadian crude-price structure.

"In view of these circumstances, and the impracticability in the near future of a long pipe line to industrialized eastern Canada, oil from western Canada seems bound to overflow sooner or later into the markets of the United States, probably first to the Middle West and later into the Pacific Northwest. The eventual construction of pipe-line outlets to these parts of the United States will tend to bring about stabilization in the long-range oil picture of western Canada. In this way Canada could conceivably become self-sufficient by balancing its imports from the United States with its exports of crude to it. Considering the tremendous volume of sedimentary rocks to be explored, the relative virgin character of the country, and the prolific nature of the fields which have been recently discovered, the petroleum future of western Canada looks very bright indeed."

L. R. Lyon, Stanolind Oil & Gas Co., Tulsa, presented a detailed report of the "Design Features of Plant in the Elk Basin Oil Field (Wyoming)." R. A. Feagan, Jr., and H. B. Manley, both with Stanolind, joined in preparation of the paper. They pointed to the fact that the Elk Basin plant "is an outstanding example of modern conservation practice," providing for recovery and utilization of gas which is commonly flared.

Utah Wildcat of Interest

There was considerable interest in a paper on "Drilling and Completion of a Wildcat Well in Southern Utah" presented by J. W. Gibson, division engineer for The California Co. The well is California's Upper Valley wildcat, Garfield County, which is still testing production from a lime, probably Pennsylvanian, between 8,777-91 ft. Drilling was completed last year, but the operator is continuing to make production tests on the well, and may deepen the well if present attempts to shut off water from the producing zone are not successful.

R. M. Churchwell, division petroleum engineer for Ohio Oil Co., Casper, presented a paper on "Lance Creek, Wyoming, Basal Sundance Repressuring." Lance Creek field was for several years the largest producing field in the Rocky Mountain region, and with good engineering practice the operators have succeeded, through pressure maintenance, in obtaining high recoveries from the field.

Turner Signs Bill Raising Oklahoma's Gasoline Tax

Gov. Roy J. Turner last week signed a bill raising by 1 cent Oklahoma's state gasoline tax. The measure, to raise funds for rural road improvements during the next 2 years, brings the Oklahoma tax to 6½ cents a gallon.

The bill will expire May 31, 1951. Aircraft and school buses are exempted.

Federal Law Limiting Imports Needed, House Committee Hears

by D. H. Stormont

DALLAS.—Foreign oil must be used only to supplement, and not supplant, domestic petroleum if the American oil industry is to continue to operate on a stable basis and build up adequate reserves for any wartime emergency. To assure this condition will exist, Congress should pass legislation which would limit the volume of oil imported into the United States by setting up a quota system.

This, generally, was the feeling expressed by witnesses in a hearing held here May 25 and 26 by the House of Representatives small-business committee studying the effect of oil imports on the operations of independent oil operators.

The hearing was held at the request of the Texas Independent Producers and Royalty Owners Association. The committee's chairman, Rep. Wright Patman of Texarkana, conducted the hearing. Rep. E. J. Keough of New York was the only other committee member present.

Thompson Favors Quota

E. O. Thompson, long-time member of the Texas Railroad Commission, declared such quotas were needed "so that producers can go forward with confidence in meeting the challenge that we have oil supply adequate for defense even though foreign oil supply be denied us."

"Independents must be assured of a reasonable market or they will be taken over by those companies who have imports as well as domestic production. If they knew how much foreign oil would be coming into the competitive American market, they could then make plans accordingly."

Thompson, questioned by Chairman Patman as to how Congress should arrive at such a quota, offered no exact figure, but expressed the belief the United States currently can absorb about 350,000 bbl. daily.

He stressed the need for more "fresh" or flush oil wells in the United States. "We are not short of oil; it's a well shortage," he asserted.

"We have plenty of undeveloped reserves; we need more fresh wells on our now proved reserves. Imported oil will slow down our drilling these needed fresh wells until it will take us 3 years to do what would have been done in 1949 if so much foreign oil had not been brought in that we here in Texas had to reduce oil allowables by 800,000 bbl. daily. Steel is just now really becoming available. If the United States oil producers had been allowed to continue with their full production, as in 1948, we could have drilled enough fresh oil wells this year to have built up enough fresh production to win a war without foreign oil."

Pratt Testifies

The immediate problem of the American oil industry is world-wide oversupply, and not the imminent exhaustion of our petroleum resources, Wallace E. Pratt, retired vice president of Standard Oil Co. (N. J.), told the committee Thursday. Pratt pointed out how all past estimates of the world's petroleum resources had proved to be gross underestimates, and that while the United States had developed its oil reserves faster we do not have a disproportionately large share. "Within the United States, the number of wells drilled by the oil industry per unit area of potentially petroleum-bearing rock is approximately 100 times greater than the rest of the earth," he pointed out.

Commenting on our reserves, Pratt concluded that it "is not the imminent exhaustion of its raw material sources which the American petroleum faces today. Our problem is to develop fully our petroleum resources and to maintain in a healthy and prosperous condition our own domestic petroleum industry in the midst of a world which faces at the moment, and seems likely for years to come to continue to face, a potential oversupply of oil."

Effects of excessive oil imports on stripper-well and secondary-recovery operations were brought out by Fred Sehman, Wichita Falls, president of the National Stripper Wells Association and executive vice president of the North Texas Oil & Gas Association. The United States today has 305,000 stripper wells producing on an average of 2 bbl. daily, he pointed out, representing a recoverable petroleum reserve of 4 billion bbl. if secondary recovery methods are used. But because of the threat of foreign oil imports not being restricted to domestic needs, he said, some producers are reluctant to engage in secondary recovery operations.

Effect on Labor Described

How labor is being affected was discussed by E. E. Phelps, director of research and education for the Oil Workers Union (C. I. O.). Between July 1948 and February of this year, he said that 7,000 people in crude oil and natural-gas production had lost their jobs according to Department of Labor figures. This he blamed on cuts in domestic oil production which had to be made, beginning in January 1949, because of increased oil imports. The unemployment figures quoted, he said, did not include well drilling and rig building, indicating the actual unemployment figure is closer to 13,000 or 14,000.

O. H. Ellis, counsel for the committee on small business, attempted to obtain from Thompson, Pratt, and other witnesses opinions as to whether importing companies would bring in oil in sufficient quantities as to depress the domestic market. Ellis also sought opinions on the effect of ECA dollars in building foreign markets for foreign oil. In general, witnesses concurred that ECA financing might have served to spread foreign oil use, but at the same time the oil reserves so developed offered a long-term threat to the domestic market.

In all, 11 witnesses testified during the two-day hearing. In addition to those already named they included Howard P. Holmes, Dallas drilling contractor; J. P. Coleman, independent operator of Wichita Falls; M. G. Cheney, president of Anzac Oil Co., Coleman, Tex.; H. P. Nichols, Tyler, executive vice president of the East Texas Salt Water Disposal Co.; Walter Henshaw, San Antonio oil man; Angus G. Wynne, vice president of the Texas operators and royal owners group; and Bryan W. Payne, of Iowa-Payne Oil Co., Tyler.

On Friday, following the hearing on oil imports, the two members of the small business committee held a hearing to investigate the pattern being followed in the distribution of steel in Texas, Louisiana, Arkansas, and Oklahoma.

Jester Signs Unitization Measure for Texas Fields

Texas' unitization bill, calling for voluntary pooling agreements for the state's oil fields, has been signed by Gov. Beauford H. Jester and will become effective 90 days from date of adjournment of the legislature.

The law apparently ends a long legislative fight for unitization, which some independent operators opposed. Sen. George Moffett and other sponsors of the legislation declared that conservation can be accomplished only by cooperation and that many operators fear prosecution under antitrust laws if they make pooling agreements now.

The Moffett bill permits "reasonable exceptions" to antitrust statutes for conservation purposes and requires approval by the Texas Railroad Commission before any agreement takes effect. It permits unitization only for secondary recovery and other conservation projects.

_____this week

NORTHWEST—Imperial Oil, Ltd., planning large crude-oil pipe line from Alberta fields to head of Great Lakes. . . . Objective is to supply eastern Canada refineries, directly or by trading crude with U. S. . . . Firm's head says further field development in Alberta pointless until transportation outlets are available. . . . ¶Speculation suggests line may come into U. S. Midwest area to connect with domestic pipe lines. . . . ¶Rocky Mountain A.P.I. meeting hears predictions that Northwest and Canadian oil will increase in importance. . . . ¶Reported shows in rank wildcats in southern Manitoba and North Dakota serve further to turn the industry's eyes northwest. . . .

TIDELANDS—Efforts to compromise the tidelands issue coming to a head. . . . Speaker calls state and federal officials to confer in Washington. . . . Government men say they might split revenues but will not admit states have any claim to ownership or voice in control. . . . Most state officials appear adamant against compromise. . . . ¶View expressed that oil industry's interest should not be overlooked in discussion of tidelands legal aspects.

REGULATION—Opposing amendment of Natural Gas Act, Commissioner Olds tells Congress FPC has complete jurisdiction over independent gas producers selling interstate. . . . Could force them to drill more wells, sell at set prices. . . . ¶Committee approves confirmation of Buchanan to FPC. . . . Tips commission balance of power to strict gas regulation. . . . ¶Industry speakers attack divorcement bills aimed at breaking up integrated operations. . . . ¶Interior Department disapproves oil activities in Okefenokee and other wild-life preserves. . . . ¶Texas court upholds order prohibiting gas flaring. . . .

INDUSTRY—Imports of oil attacked at Dallas hearing of congressional small-business committee. . . . State officials, independent producers, labor spokesmen agree. . . . ¶Oil and rubber firms join hands in launching commercial production of "cold rubber" from oil. . . . Said to be superior to any other tire material. . . . ¶A.P.I. committee releases data to combat trend away from 1,000-mile oil change. . . .

TRENDS—Total well completions so far this year have been 4.8 per cent above same period last year. . . . Most of the gain came between the middle of March and the end of April. . . . Completions for the past 5 weeks have been 2 per cent below the same weeks last year but if the Pennsylvania Grade region is omitted, the rest of the country had a 2.6 per cent increase. . . . ¶Rotary rigs in operation for the past 5 weeks have averaged about 3.8 per cent fewer than in same weeks last year. . . . ¶Gasoline demands continue strong as vacation season opens. . . .

INTERNATIONAL—Venezuelan commission's recommendations may result in offering of new concessions in the country for the first time since 1944. . . . ¶Exploration of the Gulf off southern coast of Mexico to begin soon. . . . ¶Colombia appoints new minister of mines and petroleum. . . . ¶Schoonebeek field now producing 11,300 bbl. daily. . . . ¶Y.P.F. claims a discovery on eastern part of Tierra del Fuego near southern tip of South American Continent. . . .

NATURAL GAS—Atomic Energy Commission's change to natural gas from coal for fuel at Oak Ridge, Tenn., plant is criticized. . . . Investigation of 172-mile natural-gas line recently approved by FPC may be made. . . . ¶FPC authorizes construction of 85-mile gas pipe line to serve San Diego area. . . . ¶Home Gas Co. receives permit to build 52 miles of natural-gas lines in New York.

REFINING—New lube-oil plant of Phillips Oil Co. at Kansas City now operating at capacity. . . . ¶Trend toward diesel fuel oils of lower A.P.I. gravity predicted. . . . ¶Completion scheduled within a week on new 49,000-bbl.-daily vacuum-distillation unit at Esso Standard's Bayway, N. J., refinery. . . . ¶Oil City refinery resumes operation after month-long shutdown. . . .

Spanish moss framing this rig is typical of drilling conditions in lowland areas of the Gulf Coast. The well is Showers, Moncrief & Deussen, in South Liberty field, Texas

Advantages of Cold Rubber Are Outlined at Plant Opening

by Leigh S. McCaslin, Jr.

BATON ROUGE.—Cold rubber — a new synthetic rubber which gives the average motorist at least 30 per cent greater mileage than the best grades of natural rubber in tire treads—was demonstrated here last week in the first plant to convert 100 per cent to its production.

Phillips Petroleum Co. and Copolymer Corp. were cohosts to government officials, rubber technicians, and industrial leaders at an open-house program. Commercial production of cold rubber first began at the government-owned plant in February 1948, but full capacity has been reached only in recent weeks. Eight medium-sized tire companies—operating as Copolymer Corp.—run the plant for the federal government. Capacity of the plant is more than 60,000,000 lb. annually.

Representatives of Copolymer Corp. told the guests that the major advantages of cold rubber were:

1. Cold rubber sets up a keen competitive situation tending toward lower natural-rubber prices.
2. If the replacement passenger tires in 1948 had been made with cold-rubber treads, American motorists would have saved over $205,000,000 in this 1 year alone.
3. Increased safety will result as the nonskid tread will last longer.
4. With a longer-wearing tire, the motorist can run more miles, get more comfort by carrying a lower air pressure, and drive faster with a greater degree of safety.

Natural Qualities Exceeded

A. L. Freelander, president of Copolymer, asserted that the manufacture of cold rubber marks the first time "that the quality of the best natural rubber has been exceeded, let alone equalled. Cold rubber means that the United States now has an American-made rubber that not only makes this hemisphere independent of foreign sources, but provides a rubber of a quality unequalled by any natural source anywhere in the world. And further, under present operating conditions, it costs practically no more to produce than the well-known universal type called GR-S, and costs no more to process through the tire plants."

Cold-rubber tires resulted from research and experimentation by the eight tire companies and Phillips Petroleum Co., whose technical staff, Freelander said, "stood at our elbow helping us with the many problems we had to encounter for commercial production." The eight tire companies which operate the plant are: Armstrong Rubber Co., West Haven, Conn.; Dayton Rubber Co., Dayton, Ohio; Gates Rubber Co., Denver; Inland Rubber Corp., Chicago; Lake Shore Tire & Rubber Co., Des Moines; Mansfield Tire & Rubber Co., Mansfield, Ohio; Lee Rubber & Tire Corp., Conshohocken, Penn.; and Sears, Roebuck & Co., Chicago.

Charles F. Kettering, vice president of General Motors Corp., paid tribute to the petroleum and rubber industries in an address before the group at the Roosevelt Hotel in New Orleans. He said that work such as that done in synthetic rubber and high-octane fuels has established "the kind of progressive experimentation and procedure that will make it possible for us to solve practically any problem we will face in the future."

Discounts Prophecies

The General Motors inventor and engineer discounted the prophecies of those who say our so-called fossil fuels (coal, oil, and gas) will run out in 3,500 years. Stating that this 3,500-year supply of energy is replaced in 5 weeks by the radiant energy of the sun, Kettering expressed confidence in the inventive genius of man to utilize it, if necessary.

In welcoming the visitors, Col. C. M. Hulings, operating vice president of Copolymer, said that "cold rubber first made a big impression on us when a representative of our organization returned from a Rubber Reserve Corp. technical meeting and reported on a paper presented by the Phillips Petroleum Co. which made remarkable claims for cold rubber. The paper was presented on February 10, 1947, and as a result we decided to equip our pilot plant with refrigeration to enable us to produce cold rubber and substantiate the claims of the Phillips company. This decision was reached on March 7, 1947, and we made our first cold rubber on May 24, 1947."

The technical development of the new man-made rubber was traced by Dr. W. B. Reynolds, supervisor of synthetic-rubber development for Phillips. The feeling that low-temperature processes might lead to improved synthetic rubber was first expressed by the Germans as far back as World War I. However, by World War II there was still no method known for manufacturing diene-type (general purpose) synthetic rubber in a feasible time at temperatures below 100° F.

One of the factors responsible for the final rapid development of cold rubber was a new process introduced at the University of Cincinnati. Chemists at the University of Minnesota modified this process, making possible unusually rapid results even at a low temperature. Phillips chemists also studied the new process and modified the recipe to make it suitable for large-scale production. The resulting rubber production by Phillips figured prominently in the first major tire-test program that firmly established the merits of processible cold rubber.

(A detailed technical article concerning cold rubber will appear in an early issue of The Oil and Gas Journal.)

High Texas Court Upholds Order Halting Gas Flaring

The Texas Supreme Court has upheld a Court of Civil Appeals opinion that conservation can be enforced even where it is unprofitable for the operator in a case involving flaring of natural gas in the Flour Bluff field of Nueces County.

The Austin Civil Appeals Court, which earlier had handed down the opinion, had set aside a temporary injunction granted last December against enforcement of the Texas Railroad Commission's order for Flour Bluff operators to stop flaring of gas. Similar action was taken in 16 fields.

The high court's refusal to intervene in the Flour Bluff case leaves in effect a forceful opinion by Associate Justice Robert G. Hughes of the Austin Court of Appeals.

Railroad Commission Chairman William J. Murray said that the court's action "undoubtedly" will expedite the industry's conservation program.

Montana Puts Royalty Oil Sale on New Basis

State royalty oil will be offered to all refiners in Montana on a sealed-bid basis after September 1, Gov. John W. Bonner has announced.

Speaking for the state's land board, Bonner said the present system, whereby a single operator is allowed to purchase all royalty oil produced on land owned by the state, had been extended for only 3 months, and that afterwards awards will go to the highest bidder.

The 3-year contract held by Willard Aronow of Kalispel expired May 20. The board decided to extend it to September because of the confusion that might result if a change in policy were to be put into effect immediately.

Efforts Toward Compromise on Tidelands to Come to Head Soon

ATTEMPTS to work out a compromise in the state-federal controversy over ownership of the so-called tidelands oil apparently will come to a head in the near future.

Rep. Sam Rayburn of Texas, speaker of the House, has called a meeting in Washington this week and invited officials of California, Texas, and Louisiana, as well as federal officials. Rayburn said he had no specific proposal to make but is attempting to serve as peacemaker by calling the interested parties together.

State officials in general have expressed opposition to any compromise of the issue, though last week Lieut. Gov. Allan Shivers of Texas suggested that his state might gain more by accepting a compromise now than by risking loss of all in a finish fight before Congress and the Supreme Court.

Krug Skeptical

In Washington last week Sen. Joseph C. O'Mahoney of Wyoming conferred with Secretary of the Interior J. A. Krug on the subject, but from Krug's comments later it appeared there is little chance that the administration will accept any real compromise involving ownership and administration of offshore oil.

Neither Krug nor O'Mahoney would discuss their conversation. From Krug's remarks it was apparent that the only agreement which the administration would accept would be in the field of division of revenue from the tidelands between the federal and state governments, and that, he pointed out, is a matter for Congress to deal with.

Krug indicated clearly that he, for one, was opposed to any sort of a deal that would give the states any voice in the administration of the tidelands. Most suggestions for a compromise have provided for administration by agencies on which both the Government and the states would be represented, but the secretary showed no favor for such a set-up and insisted that administration must be handled by the federal Government with the states participating, if at all, merely in an advisory capacity.

U. S. Atty. Gen. Tom C. Clark also said recently that the question of federal ownership of offshore areas is not subject to compromise, but he indicated that he might consider division of income from offshore oil rentals and royalties, state taxation of the developments, and state proration and regulation.

Arguments for a compromise are based on both the political and the legal situations.

In the California case the Supreme Court held that the federal Government has "paramount rights and dominion" over offshore lands beyond the low-tide mark, but did not use the word "ownership." The federal administration has sponsored bills to assert complete ownership and exercise regulation of offshore oil developments. Other bills propose to grant ownership to the individual coastal states while retaining federal dominion only in a token sense except in case of war.

Compromise Only Hope

It is generally conceded that state-ownership legislation probably could be passed by Congress but would meet a presidential veto, and as a result of this prospective stalemate congressional committees have not considered any of the bills. The only hope for legislation in the near future would be a compromise agreeable to all parties.

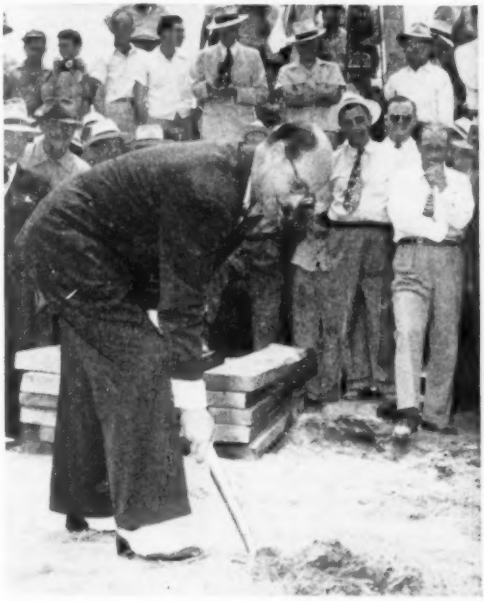
Meanwhile the Supreme Court has before it two cases claiming federal jurisdiction over the entire Continental Shelf off Texas and Louisiana. The states claim ownership only to their original boundaries—3 miles offshore in the case of California, 10½ miles in the case of Texas. In many places, however, the Continental Shelf claimed by the federal Government extends much farther and is thought capable of producing much oil.

The compromise suggested by Lieutenant Governor Shivers is that Texas surrender a portion, say 50 per cent, of its revenues from the strip it claims in exchange for an equal portion of the revenues from the area farther out. On the theory that more oil will be produced beyond the 10½-mile limit than inside of it, he argues that Texas would receive more revenue in the long run under such a compromise than if it should win complete control of its coastal strip but fail to share in the remainder.

A contrary view was expressed by Atty. Gen. Price Daniel of Texas, who urged Texans to stand firm against the federal Government. "Our case is not lost," Daniel said. "The fight has just begun, and we are going to win in the court or in Congress if Texans do not weaken or give up the fight." Daniel also said that he would not recognize the validity of any action violating the Texas annexation agreement which gave the state control of its tidelands, and that if the federal Government breaks this it could not be relied on to abide by any compromise agreement.

GROUND BROKEN FOR TRANSCONTINENTAL PIPE LINE

Claude A. Williams, president of Transcontinental Gas Pipe Line Corp., turns the first shovel of earth near Laurel, Miss., inaugurating construction operations on the company's 1,840-mile, 30-in. line which ultimately will carry 505,000,000 cu. ft. of gas daily from the Texas-Louisiana Gulf region to New York City. Gas is scheduled to be turned into the $250,000,000 line in September 1950. Later the line will be extended to the Rio Grande Valley. Final completion of the big line is scheduled in 1951, and it will serve a number of other cities on the Eastern Seaboard in addition to the New York City area



Gasoline-Tax Collections Show First Postwar Downward Dip

AS the nation's industrial output declined again in April for the fifth consecutive month, the first downturn in gasoline consumption since the war was indicated in figures on federal tax collections released last week by the Internal Revenue Bureau.

The bureau's report disclosed that gasoline-tax collections for the first 4 months of the year dipped nearly $800,000 under the corresponding period in 1948, aggregating $136,804,024 as compared with $137,600,584.

Revenue from the taxes on lubricating oils and pipe-line transportation continued to run ahead of last year but by only narrow margins, lube collections amounting to $23,741,095 compared with $23,422,973 and receipts from transportation $5,935,471 compared with $5,832,137.

The bureau's report for April showed that collections from all three taxes were down as compared with the same month last year, gasoline returning $28,106,619 against $29,411,365; lubricating oils $4,352,129 against $5,083,897; and pipe-line transportation $1,259,471 against $1,670,652.

Legislation in Mill

With no indications that the downward trend in industrial output will be reversed in the near future, a group of senators are preparing legislation to deal with a recession which will be introduced within the next few weeks, although it is not likely to be acted upon this year. Hearings may be held before the end of the session, however, so that quick action may be taken if necessary when Congress meets again next January.

President Truman is still pressing for passage of his economic-stabilization bill, offered at the beginning of the session as an antiinflation measure but now represented as a panacea for depression. That bill calls for limited price and wage controls, allocation of scarce materials, and construction by the Government of manufacturing facilities, the last proposed originally to provide steel and other materials then in short supply but now held out as a means of providing employment.

Bill Has Little Support

The administration measure has met with little favor in Congress, and the legislation now being readied will provide for joint industry, labor, and government studies of business conditions to determine what action may be needed to support the economy, and government loans to industry for expansion of production and plant facilities.

Other provisions would call for government grants to localities where new job opportunities are needed, and a broad program of public works construction. In general, the measure follows more closely the strategy of the Government in the past in dealing with depressions than it does the administration's present policy of taking full control of such situations.

Members of Congress largely appear to be in agreement that the only economic legislation that can be enacted must minimize government control, instead of expanding it as proposed by the President, hence the provisions in the projected bill for full industry participation in planning and carrying out the program.

Next Week

In-fill Drilling.—More than 1,000 new wells recently have been drilled on "in-fill spacing" in the shallow Pine Island-Caddo fields of northwestern Louisiana. District Editor Dave Stormont of OGJ gives results, describes new completion techniques.

Primary Long-Chain Alcohols.—These new petrochemical products are discussed by Peter W. Sherwood, Koppers Co., Pittsburgh, as to their manufacture by the Synol and Oxo processes.

Newhall-Potrero Field.—Primary pressure control, gas-injection operation, and reservoir data for the three zones in this pool (located 35 miles from Los Angeles) are detailed by Oran A. Graybeal, chief reservoir engineer, Barnsdall Oil Co., California division.

Pipe Line Pumping Equipment.—Significant improvements and advances in design are discussed by J. H. Cahill, chief engineer, Continental Pipe Line Co.

13-Day Turnaround.—Article describes factors involved in this achievement made at Sinclair Refining Co.'s fluid cat cracker, Marcus Hook, after a year's continuous operation.

Drill-Pipe Failures.—Description of test methods, for detection at the incipient stage. Report of A.P.I. study committee, as summarized by Walter C. Main of Technical Oil Tool Corp., Ltd.

In This Issue

. . . the international feature and international news items and the Washington material, including Watching Washington, will be found in a section beginning on page 111.

Tanker-Exchange Bill Runs Into Maritime Opposition

WASHINGTON.—Members of the Maritime Commission last week expressed opposition to legislation sponsored by Rep. Edward J. Hart of New Jersey which would permit buyers of surplus Liberty tankers to trade them in at full value on surplus dry-cargo vessels.

Testifying before the House merchant marine committee, Commissioner Raymond S. Keough indicated the view that speculators who bought the tankers when oil-carriers were scarce and in great demand were now trying to get out from under by trading them in on cargo vessels which currently can be operated to greater advantage.

"Every purchaser of a Liberty tanker knew, or should have known, that he was buying a relatively uneconomical vessel in a strictly temporary tanker freight-rate boom," Keough testified.

Vice Chairman Grenville Mellen also said the commission opposes legislation which would favor any one class of buyers of government vessels over another, and said the bill, if enacted at all, should allow only partial credit for tankers turned back.

A.P.I. Standardization Conference Meets June 6

The midyear standardization conference of the Division of Production of the American Petroleum Institute will be held in the Baker Hotel in Dallas June 6-9. A meeting of the executive committee will be held in addition to the conference sessions.

Among topics scheduled for discussion at the conference are: derricks, pipe, valves and flanges, wire rope, pumping equipment, and tanks.

Anniversary of Drake Well

The Pennsylvania Grade Crude Oil Association on August 27 will sponsor an oil-region celebration of the ninetieth anniversary of the Drake discovery oil well, drilled at Titusville, Pa.

PERSONALS

Gershinowitz Is Leader In Petroleum Research

DR. HAROLD GERSHINOWITZ, not yet 40 years old, has already established himself as an outstanding leader in the field of petroleum research.

As director of the newly created division of exploration and production research for Shell Oil Co., Inc., with headquarters in Houston, Gershinowitz, since 1945, has been primarily engaged in the designing and construction of the company's new laboratory and in building up its research organization and staff.

Joining Shell Oil in 1938 (then Shell Petroleum Corp.) Gershinowitz pioneered in the application to petroleum cracking of modern methods of studying reaction rates and in the development of chemical analysis by means of infrared spectroscopy. At the age of 29, in 1940, he was put in charge of the new research laboratory at Shell's Houston refinery.

In 1942 Gershinowitz was moved to the company's head office in New York as director of research for the manufacturing department with the responsibility for the programs and policies of the Wood River research laboratories, engaged in product research and development, as well as of the Houston refinery research laboratory, studying refining processes.

Prior to joining Shell he served in 1935-36 as research associate to Prof. Harold C. Urey at Columbia University. The following year he returned to Harvard University, where he had graduated in 1934 with a Ph.D. in physical chemistry, and designed and constructed a novel recording infrared spectrometer, Harvard's first, which has remained in use ever since.

Gershinowitz is an active member in many professional societies such as the American Chemical Society, the American Association for the Advancement of Science, the Institute of Aeronautical Sciences, and the Society of Automotive Engineers.

Ralph Lowe, independent oil operator and drilling contractor of Midland, Tex., has entered Rocky Mountain development and has established a branch office in Casper, Wyo. **Frank Manning,** formerly of Midland, has been placed in charge of the office. **C. Louis Chase** has joined the firm in its Midland office, where he will do geological work.

H. A. Rhodes, Humble Pipe Line Co., has been elected chairman of the newly formed National Petroleum Radio Frequency Coordinating Committee, in Washington, D. C. **W. G. McLarry,** Magnolia Petroleum Corp., and Magnolia Pipe Line Co., was elected secretary.

J. E. Marsland has been appointed assistant manager of the technological department, Shell Oil Co., Inc., in the head office of manufacturing in New York, succeeding **S. J. Meisenburg,** recently transferred to Wilmington, Calif. **M. W. Boz** has been named assistant manager of the methods and statistics department of the company's organization in the New York office.

James E. Holton, of the package division of Esso Standard Oil Co.'s Bayonne refinery, commands the newly activated 355 Chemical Smoke Generator Co., a reserve affiliated unit of the U. S. Army.

S. J. Gardner, Western Oil & Fuel Co., Minneapolis, has accepted a position as traffic manager for Husky Refining Co., at Cody, Wyo.

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Gustav Egloff, petroleum technologist and director of research for Universal Oil Products Co., Chicago, has been elected president of the Western Society of Engineers. He will be installed at the society's annual dinner meeting June 6. Dr. Egloff is the recipient of the Octave Chanute Medal of the society, as well as the Gold Medal of American Institute of Chemists. He was named one of the "Modern Pioneers" by National Association of Manufacturers in 1940.

R. W. McDOWELL

Robert W. McDowell, executive vice president, Mid-Continent Petroleum Corp., Tulsa, has been elected president of the company. Other changes in the company's personnel include: **T. E. Fitzgerald,** general sales manager, elected vice president of marketing; **G. E. Wynn,** general superintendent, West Tulsa refinery, elected vice president in charge of manufacturing; and **D. Glenn Morgan,** refinery manufacturing manager, named director of research and development, a newly created position. **F. B. Koontz,** who gave up the presidency of the company a year ago because of ill health, was reelected vice chairman of the board of directors. **Jacob France,** chairman of the board, had been serving also as president of the company.

J. C. Cramer has been named chief engineer and will supervise plant engineering and process engineering divisions of Esso Standard Oil Co.'s Baltimore refinery. **E. H. Peterson** has been promoted to assistant process and stock coordinator; **Nejib Mirzy** has been named new plant engineer in charge of the plant engineering division, and **C. G. Green** has been named the new maintenance engineer, supervising the maintenance engineering division and regional engineers.

John S. Kelly, formerly district geologist in Wichita Falls, Tex., for American Republics Corp., has been transferred to San Angelo, Tex., where he is working geology in West Central Texas.

H. S. Hicks, Shell Oil Co., Inc., has been appointed manager of the utilities department in the Wilmington, Calif., refinery.

Donald G. Herring, Jr., district geologist at Jackson, Miss., for The Texas Co., has moved to New Orleans, where he will cover exploration work in South Louisiana.

John H. Vandenberg, Jr., plant engineer at the Jennings, La., cycling plant of Stanolind Oil & Gas Co., has been named plant engineer at the company's Salt Creek gasoline plant, Midwest, Wyo. Other changes in the Rocky Mountain division in-

PERSONALS

clude: **Jean W. Heims,** geologist, transferred to Casper, Wyo., from Tulsa; **Lynn D. Ervin,** field seismic supervisor, moved to Casper from Ardmore, Okla.; and **W. J. Moore,** made party chief of a seismograph party at Rock Springs, Wyo.

F. J. Schempf, division manager at Oklahoma City since 1948 for Stanolind Oil & Gas Co., has been named manager of the company's Texas-Louisiana Gulf Coast division at Houston, succeeding **R. E. Nelson, Jr.,** who has resigned to become assistant to the president of Stanolind Pipe Line Co. at Tulsa. **C. T. Jones,** manager of the foreign exploration department with headquarters in Tulsa for Stanolind Oil & Gas Co., has been named head of the central division at Oklahoma City, replacing Schempf. Schempf joined Stanolind in 1933 and has served as division geologist in the North Texas-New Mexico division and district production superintendent for East Texas district. Jones started with the company in 1934 and has served as geologist and division manager of exploration for the Rocky Mountain division. Nelson will assume his new duties with the pipe-line company June 1. He joined Stanolind Oil & Gas in the early 1930's and has served as unitization supervisor and production superintendent, as well as executive assistant to the director of producing and manufacturing.

R. E. NELSON, JR.

F. J. SCHEMPF

C. T. JONES

W. A. Delaney, Ada, Okla., independent operator, has become chairman of the board of directors of the new Louisiana Natural Gas Corp. The company has started operation of a 100-mile natural-gas pipe line in southwestern Louisiana.

S. R. Simmons, Interstate Oil Pipe Line Co., Shreveport, has been named assistant manager of the company's southern division, in addition to his present duties as division general superintendent. **Joe C. Rawlins,** Tulsa, present chief engineer for the company, will move to Shreveport as assistant to the manager of the southern division. **E. M. Henderson,** former assistant chief engineer who has been on special assignment with Standard Oil Co. (N. J.) will return to Tulsa as chief engineer.

J. E. Low, division superintendent of Amerada Petroleum Corp., Fort Worth, has been transferred to the Tulsa headquarters as assistant general superintendent. He will have general supervision of the company's operations in Texas and New Mexico. **J. O. Hathaway,** district superintendent at Midland, Tex., has been transferred to Fort Worth, succeeding Low. **R. E. Seifert,** who has been assistant district superintendent at Midland, has been appointed to succeed Hathaway. **D. C. Capps,** assistant district superintendent at Longview, Tex., has been transferred to the Midland offices in the same capacity, and **H. W. Deax,** chief clerk at Fort Worth, has been transferred to Tulsa, serving in the same capacity for the new Texas-New Mexico area.

Thomas J. Sullivan has been elected vice president in charge of manufacturing for Gulf Oil Corp., and **Bonnar H. Barnes** has been named general manager of refineries for the company. Also elected at the recent board of directors meeting were **W. A. Berryman** and **Willard F. Jones,** who were named vice presidents. Sullivan joined Gulf in 1921 as a foreman in the acid plant at Port Arthur, Tex. He later was elevated to assistant gen-

T. J. SULLIVAN

B. H. BARNES

Division superintendents and division engineers for Sunray Oil Corp.'s production department are shown in Tulsa, May 26, at a 2-day meeting held to review the company's operating program. Left to right, front row: Alvin Summers, Oklahoma division superintendent, Oklahoma City; J. R. Vandever, assistant production superintendent, Tulsa; H. O. Harder, vice president in charge of production; C. C. Shreve, Kansas division superintendent, Great Bend; Perry A. Gill, North and West Texas division superintendent, Midland; and Carl E. Wilson, Gulf Coast division superintendent, Alice, Tex. Back row, standing: V. L. Smith, southern Oklahoma district superintendent, Wewoka; Fred M. McDaniel, assistant division superintendent, Great Bend, Kans.; C. F. McCarroll, technical assistant, Tulsa; C. J. Kerwin, manager of partnership operations, Tulsa; J. F. Adkisson, Jr., reservoir engineer, Tulsa; Fred Goddard, district engineer, Madison, Kans.; and Lee Pruitt, district engineer, Odessa, Tex.

eral superintendent of the plant and subsequently became general superintendent of Texas refineries. He was moved to Pittsburgh in 1939 as assistant general manager of the manufacturing department and later was named general manager of the department. Barnes also joined the firm in 1921, as a chemist. He was soon promoted to superintendent of the Sweetwater, Tex., refinery, and served as assistant general superintendent and general superintendent of Texas refineries. He was appointed general manager of the manufacturing department in Pittsburgh in 1945.

T. G. HUGHES

T. G. Hughes, with Oronite Chemical Co., subsidiary of Standard Oil Co. of California since 1943, has been elected executive vice president of the firm. He has been with Standard of California since 1926. The chemical products subsidiary also announced appointment of **B. W. Anthony** as a director and secretary-treasurer. He joined the firm in 1943, and subsequently was made a vice president of Cal-Spray.

Herman G. Gunter has been appointed superintendent of Carter Oil Co.'s new Billings, Mont., refinery, which is scheduled for completion late this summer. He has been with Standard Oil Co. (N. J.) since 1930, and before going to Billings 2 years ago was process superintendent of the Baltimore refinery. He has been associated with fluid catalytic cracking since its early development and before becoming process superintendent at Baltimore he was in charge of the 25,000-lb. fluid catalytic cracker there, one of the first three ever built. He later was placed in charge of all high-octane facilities at the Baltimore refinery.

W. J. CARTHAUS

William J. Carthaus, Tulsa, has been elected vice president of manufacturing and research for Deep Rock Oil Corp., succeeding **Wilford E. Moody,** retired. Carthaus formerly was assistant to the president and has been with Deep Rock for 20 years, serving in various capacities. Moody retired on June 1 after 45 years in the oil industry.

L. M. Daugherty, former field superintendent at Joaquin, Tex., for Paul H. Pewitt Co., is now located in Kilgore, Tex., where he is in charge of drilling and production in Shelby, Marion, and Upshur counties.

M. L. Leonard, vice president and director of Eureka Pipe Line Co., has been elected president of the firm. He formerly was with Cumberland Pipe Line Co., in Somerset and Winchester, Ky., and joined Eureka Pipe Line in 1933, where he served as manager, and subsequently vice president and director.

Al Pfeuffer, formerly with Pure Oil Co. at Reed City, Mich., has joined Sohio Petroleum Co. as chief clerk and will be stationed at Owensboro, Ky.

Harold D. Becwar has moved to Corpus Christi as district geologist for The Texas Co. He formerly was with the firm at San Antonio.

George Allman, Jr., field engineer for The Texas Co., Daisetta, Tex., has been moved to Liberty, Tex., as district reservoir engineer.

SHIFTS—

T. H. Acres, engineer, Barnsdall Oil Co., Los Angeles to Newhall, Calif.; **Richard Lee Robb, Jr.,** engineer, Union Oil Co. of California, Wilmington to Torrance, Calif.; **R. L. Mills,** superintendent, Humble Oil & Refining Co., Dickinson to Houston, Tex.; **Andre J. Ginestet,** engineer, SNMAREP, Tulsa to Paris, France; **James E. Fuller,** superintendent, Rocky Mountain Drilling Co., Santa Paula to Cuyama, Calif.

H. C. Dye, superintendent, Rocky Mountain Drilling Co., Bakersfield to Newhall, Calif.; **C. W. Ewing,** superintendent, Rocky Mountain Drilling Co., Fullerton to Bakersfield, Calif.; **William F. Kruse,** engineer, Amerada Petroleum Corp., La Habra to Fresno, Calif.; **E. Harold Rader,** engineer, Standard Oil Co. of California, Los Angeles to Whittier, Calif.; **Lurl S. Ostrander,** superintendent, Rocky Mountain Drilling Co., Oildale to Avenal, Calif.

Kenneth R. Caldwell, engineer, Gasoline Plant Construction Corp., Quanah to Kingsville, Tex.; **J. F. Cason,** superintendent, Crown Central Petroleum Corp., Abilene to Merkel, Tex.; **C. D. Wakefield,** geologist, Marine Exploration Co., Bay City to Houston, Tex.; **W. C. Guess,** foreman, Sun Oil Co., Beaumont, Tex., to Abbeville, La.; **Jerry V. George,** engineer, Magnolia Petroleum Co., Brownfield, Tex., to Lake Charles, La.

R. A. Rank, geologist, British American Production Co., Graham to Fort Worth, Tex.; **Joseph D. Alcott,** engineer, Shell Oil Co., Inc., Houston to Midland, Tex.; **James Helis,** engineer, Atlantic Refining Co., Houston, Tex., to Franklin, La.; **H. G. Mariner,** engineer, Stanolind Pipe Line Co., Lubbock, Tex., to Casper, Wyo.; **William Ramsay Gray,** geologist, Sun Oil Co., San Angelo to San Antonio, Tex.

Leo B. Agers, engineer, Magnolia Petroleum Co., Lake Charles, La., to Cement, Okla.; **S. H. Schnarre,** superintendent, Shell Oil Co., Inc., Bourbonnais to Sibley, Ill.; **J. D. Castner,** engineer, Sohio Petroleum Co., Centralia, Ill., to Owensboro, Ky.; **Paul Johnson,** foreman, Continental Oil Co., Lucedale, Miss., to Tyler, Tex.

DEATHS

Charles Edwin Mills, 53, managing director of Northern Development Co., Ltd., died in Calgary, Alta., Canada, May 22.

Charles Edwin Foster, 46, toolpusher for Smith, Story & Wood Corp., in South Texas, died recently.

Ray D. Mering, division marketing manager, Socony-Vacuum Oil Co., Inc., died in Kansas City May 22. He formerly was associated with Sinclair Oil Co., in Wichita, and White Eagle Oil Co., a firm which later was merged with Socony-Vacuum.

Henry J. Schossler, 46, Oil City, Pa., independent oil operator, died May 22.

George D. Nordenholt, former president of Pacific Petroleum Co., and former director of California Department of Natural Resources, died in Los Angeles May 22.

L. W. Powers, 30, former pilot for Stanolind Oil & Gas Co., was killed in an automobile accident near Panama City, Okla., May 25.

Charles Leys, engineer at Bayway refinery, Standard Oil Co. (N. J.), before being transferred to Oklahoma City, died May 23.

GAS-INJECTION PROJECT OF A

West Emery pool has been operated for 4½ years in a depletion-type California reservoir with a thick and somewhat lenticular low-permeability sand section

by F. S. Fowler*

WEST COYOTE oil field, located about 20 miles east of Los Angeles, was discovered in 1904, but the deepest of its six producing horizons, the Emery zone, was not discovered until January 1930, when well 43-A Emery was brought in flowing at a rate of 750 bbl. per day oil and 1 bbl. per day water, at a gas-oil ratio of 390 cu. ft. per barrel. The pool was produced by natural depletion until mid-1944, when a gas-injection project was started.

Description of Reservoir

Structure.—The field is an elongated anticlinal structure about 2½ miles long and ¾ mile wide. The Emery zone is encountered at depths ranging from 5,000 to 6,000 ft. A transverse fault, which has proved to be a barrier to migration, separates the zone into two principal pools, the western of which is known as Emery West pool. Structural contours of Emery West pool are regular with flank dips of 16° to 18° (see Fig. 1). The pool is bounded by a transverse fault on the east. A longitudinal fault, believed to be a barrier to migration, establishes the northern boundary. The westerly and southerly productive limits are defined by the oil-water contact. The pool has a productive area of about 250 acres.

Sand characteristics.—Reservoir rocks are of the Repetto formation of the Lower Pliocene age. The zone is somewhat lenticular with interbedded fingers of sand and shale. While major sand bodies are persistent, some individual sand fingers cannot be correlated further than several locations. The productive measures are about 800 ft. thick in the central and northern areas, progressively thinning as the western limits are approached. The sands are clean, fairly well consolidated, and range from 60 to 360 ft. aggregate net thickness in well-bore exposures.

The core data consist primarily of complete analysis of the basal 650 ft. of the section at a central well. It is estimated that the reservoir sands have an average porosity of 20 per cent and an average permeability of 70 md. The permeability variation is appreciable, with individual values ranging from 5 to 800 md. The original productivity indices of the central wells were about 2.5 bbl. per day per psi. drawdown with specific productivity indices averaging about 0.01 bbl. per day per psi. per foot.

Reservoir fluids.—Emery West pool did not have a primary gas cap and the original fluid saturations have been estimated at 65 per cent oil, 0 per cent free gas, and 35 per cent water. At the time of discovery the pressure in the reservoir was about 2,650 psi. at the depth of —5,300 ft. This pressure is approximately equal to the hydrostatic pressure at that depth. The oil has a tank gravity of 33° A.P.I. and was originally saturated with gas. Pressure-volume-temperature tests indicate that the original solution gas-oil ratio and formation volume factor were 550 cu. ft. per barrel and 1.3, respectively.

Development.—Following the discovery of the reservoir in 1930, development proceeded gradually and was not completed until 1943. There are now 29 wells in the pool and the average spacing is 9 acres per well.

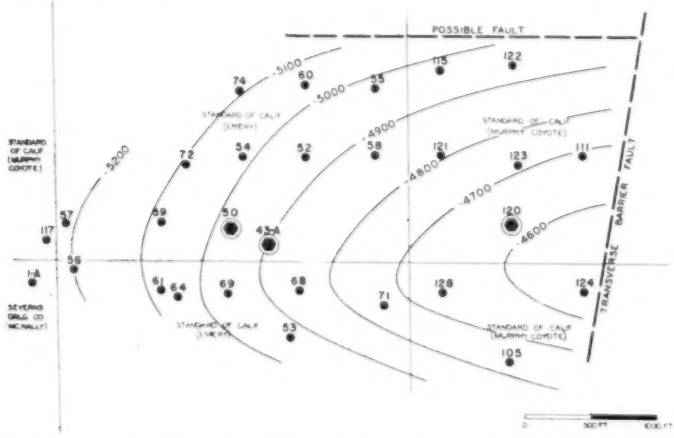


Fig. 1—Subsurface structure map, Emery zone. Portion west of fault forms Emery West pool

*Standard Oil Co. of California, La Habra, Calif. Summarization of paper presented at A.P.I. Pacific Coast district, division of production, Los Angeles, May 12-13.

All wells in the eastern and central portions of the pool expose substantially the entire zone. At the western tip of the pool, the exposure lessens to a minimum of about 150 ft.

Pool Performance Prior to Injection

Oil.—The productive history of the pool can be resolved into several periods. Active production did not start until 1932, or 2 years after the discovery (see Fig. 3). During the period 1936 to mid-1942, production was limited to about 1,000 bbl. per day. Most of the wells were shut in during this period. With the advent of the war, the oil rate was increased to about 3,500 bbl. per day during the latter portion of 1942, decreasing to 1,600 bbl. per day by mid-1944, when the gas-injection project was started. During these periods the pool was not operated at capacity.

Gas-oil ratio.—Pool gas-oil ratio averaged 680 cu. ft. per barrel the first year of active production. Four years later, at the close of the first active period of production, the producing gas-oil ratio had increased to 1,800 cu. ft. per barrel. During the ensuing 6-year period of low production, the gas-oil ratio was somewhat less, ranging from about 1,000 to 1,500 cu. ft. per barrel. This decrease was caused by limiting production of upstructure wells and did not represent a reduction in individual well ratios due to the lowered withdrawal rates.

After oil production was increased in 1942, the gas-oil ratio built up steadily to 5,000 cu. ft. per barrel in June 1944. The areal distribution of producing gas-oil ratios at the start of injection in mid-1944 shows that a region of high gas saturation had formed on the crest of the structure. Of the 29 producing wells, 8 were shut in at this time because of their high gas-oil ratios.

Pressure.—Static-pressure surveys have been made quarterly since active production began. Emery zone wells have a characteristic long-time pressure buildup that has been observed to continue for over a year. A number of long-period buildup observations were taken during the 6-year low-production period from 1935 to 1942 and the time-static pressure relationship appears to be a semi-logarithmic function. Static-pressure buildup data for two wells are shown in Table 1.

TABLE 1—STATIC SUBSURFACE PRESSURE BUILDUP DATA ON A CENTRAL AND AN EDGE WELL

Time shut-in days	Pressure psi.	Buildup rate psi. per day
Central Well		
0 (producing)	623	
0.5	1,391	1,536
1.0	1,440	298
2.0	1,484	44
4.0	1,535	26
28	1,665	5.4
51	1,702	1.6
100	1,750	1.0
239	1,809	.4
394	1,820	.1
Edge Well		
4	896	
34	1,016	4.0
86	1,057	0.8
110	1,068	0.5
151	1,081	0.3

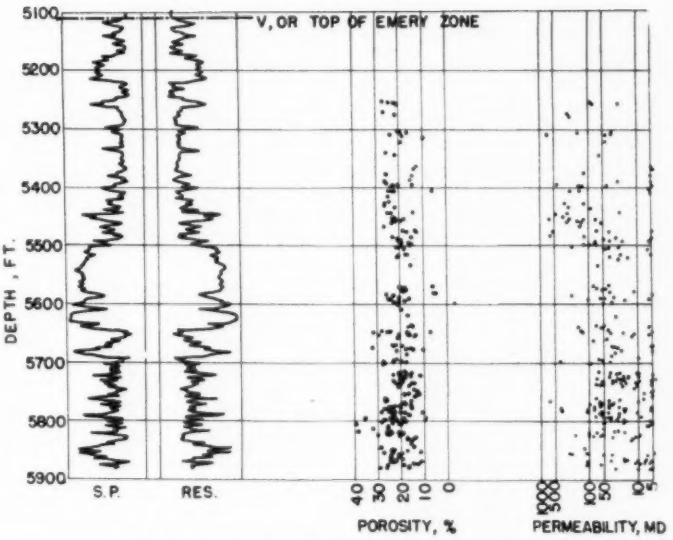


Fig. 2—Electric and core logs in typical well, central area

There are two shut-in wells available for reservoir pressure observation. These wells are Emery 64, which has not been produced since 1937, and MC 124, which has been shut in since 1935, except for brief periods of production. Static pressure measurements are taken monthly at these two wells.

Reservoir pressures have been obtained by volumetrically weighted estimates and by materials balances, assuming no encroachment of water. During the 6-year low-production period most of the wells were shut in, as previously mentioned, and it is believed that the volumetrically weighted method gave reliable estimates of the static equilibrium pressure in the reservoir at that time. These values check very closely with pool pressures determined by materials balances, based on the assumption of zero water encroachment. This lends further weight to the belief that water encroachment is insignificant.

The reservoir pressure decreased from its initial value of 2,650 to 1,150 psi. at the start of the injection program in mid-1944. This represents a 56 per cent decrease in pool pressure. The rate of decline in pressure was 0.65 psi. per day during the first half of 1944.

The areal distribution in static pressure on July 1, 1944 (96-hour shut-in period at —5,300 ft. subsea datum) in pattern, is similar to that of the structural contours, with the highest pressures existing at the highest structural position, and the lowest at the outer limits of the pool.

At the start of the injection program, oil recovery was 7,800,000 bbl., and gas recovery was 13,000,000 M.c.f. Of the 29 wells, 9 were shut in principally because of high gas-oil ratio, 13 wells were flowing, and 7 wells were pumping. Production for June 1944 was 1,686 bbl. per day oil, 167 bbl. per day water, and 9,122 M.c.f. per day gas, at a gas-oil ratio of 5,412 cu. ft. per barrel.

Gas Injection Program

Gas injection was started in July 1944 under the following program: Oil production was to be continued as long as possible at the existent rate of 1,600 bbl. per day and net gas withdrawals were to be restricted to a maximum of about 5,000 M.c.f. per day. A 1,200-hp. injection plant with a capacity of 10,000 M.c.f. per day was installed. Pilot injection tests were not undertaken since it was desired to expedite the gas-injection program as much as possible.

Two existing wells were employed for the initial injection wells, 43-A Emery (the discovery well) and 120 MC. Both wells had been previously shut in because of their high gas-oil ratios, were favorably situated structurally with two surrounding rings of producible wells, and were approximately equidistant from the common lease boundary. The 120 MC penetrated the full pay interval, but 43-A Emery exposed only the upper half of the section. This well was subsequently deepened.

In an effort to promote an even spread of the injected gas, the production of individual wells was scheduled so as to withdraw equal volumes of reservoir fluids from each

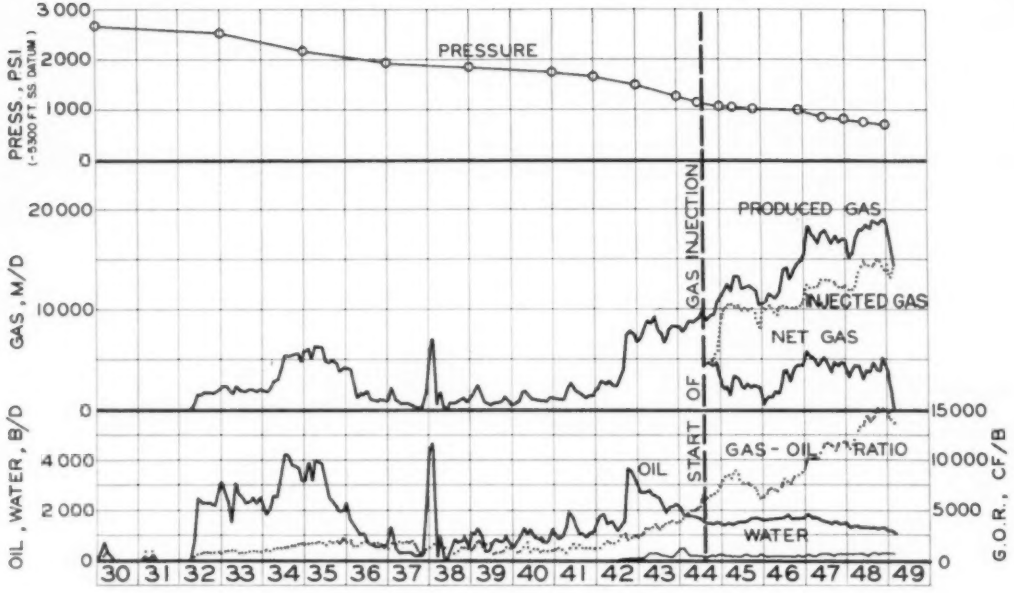


Fig. 3—Production and gas-injection data for Emery West pool

of the inner ring of wells. This required returning six wells to production that had been previously shut in because of their high gas-oil ratios.

During 1945 and 1946 injection was continued at 10,000 M.c.f. per day and oil production was maintained at about 1,600 bbl. per day. The net gas withdrawals averaged about 3,000 M.c.f. per day. Material-balance calculations indicated that the decline in reservoir pressure was reduced to about 0.2 psi. per day as compared with 0.65 psi. per day which existed prior to the initiation of the project. Soon after the start of injection, pressure measurements at most of the wells also gave evidence that decline in pressure had been materially decreased.

Gas bypassing.—Bypassing of gas from injection well 43-A Emery to the nearest producing well, 50 Emery, commenced almost immediately after injection was started. At the inception of the project, these wells were believed to be 600 ft. apart, but subsequent directional surveys showed that their subsurface locations are only 350 ft. apart, thus helping to explain the early bypassing. (The well locations shown on Fig. 1 represent the subsurface positions of these wells.)

The gas-production rate of 50 Emery increased from 450 to 900 M.c.f. per day during the period June 1944 to January 1945, indicating that perhaps 400 M.c.f. per day of the 5,000 M.c.f. per day being injected into 43-A Emery was bypassing to this well. Production of 50 Emery was continued and the gas-oil ratio increased at a reduced rate, reaching a value of 23,000 cu. ft. per barrel in January 1946. This well was subsequently converted to an injection well.

Two other wells adjacent to the injection wells, 68 Emery and 111 MC, also evidenced increases in gas-oil ratio following the start of injection. However, the effects occurred later and were much less pronounced than at 50 Emery. No other wells evidenced large abnormal increases in gas-oil ratio during the first 2 years of injection. The pool gas-oil ratio increased normally until mid-1945.

Decrease in Gas-Oil Ratio During 1945

An unusual reversal of the upward pool gas-oil ratio trend occurred during 1945. During the first year of injection, the pool gas-oil ratio increased to a peak value of 8,900 cu. ft. per barrel by April 1945. As shown on Fig. 3, the ratio then started to decrease. This trend continued until November 1945 by which time the ratio had dropped to 6,000 cu. ft. per barrel.

The decrease was not due to selective operation of wells, or to a change in withdrawal rates. A substantial reduction in the gas-oil ratios of 14 individual wells was observed, including all wells on the Emery lease north and west of injection well 43-A Emery.

This increase in oil rate apparently resulted from an increased productivity of the formation, and not from

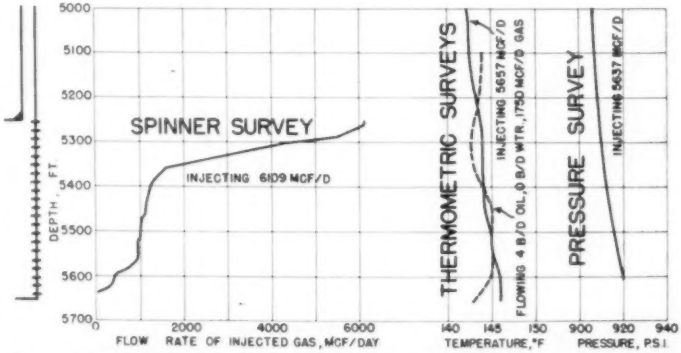


Fig. 4—Spinner, thermometric, and pressure surveys run to determine position of gas entrance in well

more effective lifting methods. The behavior has been attributed to a forced migration of oil from the central area to the northwestern area, which resulted in increased oil saturation in this region and attendant increase in oil productivity and decrease in producing gas-oil ratio at the affected wells. This effect has been interpreted as resulting from the injection program, and as being favorable to ultimate recovery.

Effect of shutting in wells.—Wells have been shut in for periods ranging from one month to several years, both before and after the start of the injection program. Prior to injection, it was the general experience that the gas-oil ratio was substantially lower for some months after the wells had been returned to production. A shut-in period of several months at 105 MC early in 1944 reduced the gas-oil ratio from 12,000 cu. ft. per bbl. to 4,000 cu. ft. per bbl. Again, in 1945, a reduction from 13,000 to 9,000 cu. ft. per bbl. was obtained in the same manner.

Changes in Injection During 1947

The pool gas-oil ratio again resumed its upward trend during the second quarter of 1946, reaching 10,000 cu. ft. per barrel in January 1947 with gross gas production rate of about 18,000 M.c.f. per day. Net gas production increased correspondingly under the existing injection rate of 10,000 M.c.f. per day. Injection was increased to 12,000 M.c.f. per day in January 1947. By this time, while it appeared that the injection program was beneficial, it was also realized that improvement was possible. Some of the work performed to determine the most practical means of improving operations is discussed below.

Thermometric surveys.—Thermometric surveys were made at nine high-ratio wells while flowing through the casing at rates up to 100 bbl. per day oil and 3,000 M.c.f. per day gas. Several wells were tested under static and flowing conditions at low and high rates. Significant temperature anomalies were not generally observed and the results were considered inconclusive. It is believed that the gas was probably entering the wells over fairly broad intervals and, therefore, significant changes in temperature were not produced. The results suggested that the injected gas was being displaced into the upper portion of the zone.

Spinner survey.—A spinner survey was made at 43-A Emery, using a sensitive, large-diameter instrument. Preparatory to running the test, the well was killed with oil and the tubing was removed from the well. After a short period of production, the well was returned to injection at the former injection rate. Injection pressures were unchanged from previous values thus indicating that the well did not suffer loss of injectivity as a result of the work.

The spinner survey was made several weeks later with excellent results. As shown on Fig. 4, the spinner results were sharply definitive (as compared with the generalized indications found in a number of thermometric surveys made). Of the total of 6,000 M.c.f. per day injection, about 4,500 M.c.f. per day, or three-fourths, of the injected gas was being displaced into the uppermost 100 ft. of the pay.

Gasoline content.—Prior to the start of injection, gasoline content of the produced gas averaged 0.96 gal. per M.c.f., ranging from 0.7 to 1.3 gal. per M.c.f. Recent tests show that the average gasoline content is 0.94 gal. per M.c.f. The gasoline content of the gas from wells that are producing large volumes of bypassing injected gas (gas-oil ratios in excess of 30,000 cu. ft. per barrel) is presently only about 20 per cent lower than the original content. The tests indicate that the injected gas (which has a gasoline content of about 0.1 gal per M.c.f.) is absorbing large quantities of light hydrocarbons in its passage through the reservoir.

Doubling injection rate, eastern area.—During the third quarter of 1947, when 43-A Emery was off for repair and test work, the entire volume of gas available for pool injection, 12,000 M.c.f. per day, was put into 120 MC, thus doubling the previous injection rate at this location. The gas was injected into both tubing and casing to avoid an undesirable increase in injection pressure at the high rate. This large and sudden increase in injection did not result in an equivalent increase in bypassing. Only one well, 123 MC, was noticeably affected, showing an increased gas production of about 500 M.c.f. per day. There was a slight increase in static pressure in the eastern area during this period.

Recent Performance of Project

Oil.—All wells have been produced substantially to capacity since 1946 except those having extremely high gas-oil ratios. Production from these gassy wells has been limited to hold pool net gas withdrawals within the 5,000 M.c.f. per day gas top, and to keep the gross gas production within the capacity of the absorption plant. Under this operation, oil production averaged 1,150 bbl. per day in January 1949. Recovery of oil to January 1, 1949, was 10,400,000 bbl. Oil produced under the injection program has amounted to about 2,600,000 bbl., or 25 per cent of the total recovery to date.

Produced and injected gas.—The capacities of the absorption and injection plants were each increased by about 2,000 M.c.f. per day in January 1947. Withdrawals from the restricted gassy wells were increased accordingly, as shown on Fig. 3. During the first quarter of 1948 the absorption and injection plants were again enlarged. Gas production and injection were increased to about 18,000 and 14,000 M.c.f. per day, respectively, leaving a net gas production of about 4,000 M.c.f. per day. These gas rates were continued through the remainder of 1948.

Gas-oil ratio.—The accelerations of the pool gas-oil ratio during the first quarters of 1947 and 1948 (Fig. 3) were each caused by the previously mentioned increases in the withdrawal rates from the restricted gassy wells.

The pool gas-oil ratio was increasing rapidly prior to June 1947. During the succeeding 8 months the trend changed, and no appreciable increase in gas-oil ratio occurred during this period. This effect was due to revision of injection operations in the western portion of the pool at 43-A and 50 Emery wells, which involved a reduction in injection into the upper portion of the zone, and initiation of injection into the central and lower measures.

In January 1949 the gas-oil ratios of individual wells ranged from 1,000 cu. ft. per barrel at the western tip of the pool to a maximum of about 30,000 cu. ft. per barrel in areas immediately surrounding the injection wells, as shown on the gas-oil ratio map for January 1949. The spread of the injected gas in the central area of the pool is clearly indicated by the changes that have taken place in the gas-oil ratios of the individual wells since the start of injection.

Static pressure.—During 1947 and 1948 the reservoir pressure declined from 1,000 to 700 psi. The average pressure decline rate during this period was 0.4 psi. per day. The pressure decreases uniformly from the injection wells to the outer wells, and no undesirable pressure gradients or sinks are in evidence.

Full Pressure-Maintenance Project

The injection program was recently changed to operate the pool as a full pressure-maintenance project. An additional 400 hp. compressor capacity has been ordered to provide an increase in injection rate to 17,500 M.c.f. per day. On February 4, 1949, gas production was reduced to the existent plant capacity injection rate of 14,000 M.c.f. per day to avoid further loss in reservoir pressure during the interim period until the compressors are installed. Gas production and injection will be increased to 17,500 M.c.f. per day when the new plant installations have been completed.

Under this program, pool production for February 1949 was 1,052 bbl. per day of oil, 237 bbl. per day water, and 14,215 M.c.f. per day gas at a gross gas-oil ratio of 13,509 cu. ft. per barrel. Gas injection and net gas production were 14,180 M.c.f. per day and 35 M.c.f. per day, respectively. Of the 29 wells, 8 were flowing, 13 were pumping, 5 were shut in, and 3 were being used for injection.

The general superintendent's meeting, held monthly during the current major construction program at the refinery, features a wall-size chart of all projects included in the expansion program. By means of colored tapes, the current status of each project, its projected completion date, and its progress with respect to the master schedule, are shown graphically, giving an over-all picture of the entire program which is the principal topic of discussion

STREAMLINED COORDINATION

by George Weber

COORDINATION of the many diverse operations performed in a major refinery has become an important function of efficient plant management. Varying seasonal demand and postwar improvements in products have kept most refineries in a constant state of change. The integration of new and modified units, now being placed on stream at a record rate, greatly complicate the problem of maintaining top efficiency in complete refineries. The introduction of new crudes, particularly prevalent in East Coast plants, has contributed further to the need for an administrative framework allowing uninterrupted processing schedules near the capacity level.

The organization at Esso Standard Oil Co.'s Bayway refinery at Linden, N. J., illustrates one method of administering a complex operation. The Bayway refinery at the present time is a very busy place. The largest construction program ever undertaken at the plant is now nearing completion. Modifications of other existing facilities to conform to the new expanded program are being coordinated for simultaneous initial operation. Preparation for the current program for meeting 1950 manufacturing requirements, superimposed on the normal need for flexible adaptation to market demands, requires a close day-to-day coordination of all interrelated operations.

Bayway is classed as a fuel-products plant whose principal output includes finished gasolines, heating oils, gas oils, and fuel oils. In addition, the manufacture of such specialty products as insecticides, medicated oil, mineral oil, lube-oil additives, and antifreeze, as well as numerous industrial products including solvents, white oils, sulfonates, and alcohols, is now integrated into the Bayway refinery operation.

Independent Administration

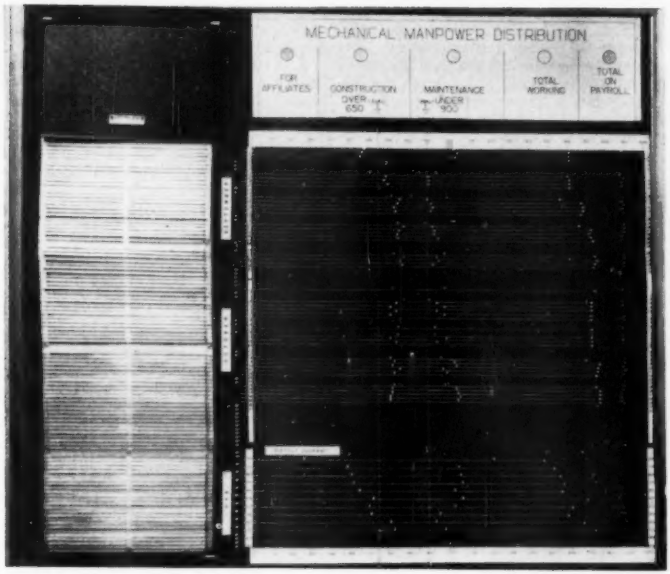
As a part of the company's New Jersey Works, Bayway is tied by pipe line and water transport to the nearby Bayonne and Eagle Works which refine, blend, and package a full range of lubricants, waxes, and asphalts. As the major crude-processing plant in the group, Bayway provides the other units with some raw stocks and thus becomes part of a complete refining operation. Both the Bayway and Bayonne plants are administered as independent refineries and only the accounting system is consolidated in the offices of the New Jersey Works.

As illustrated in the organization chart, Bayway administration under the general superintendent is broken down into eight main departments, the two largest headed by the process and mechanical superintendents. The administrative setup as charted, is a flexible framework which undergoes changes from time to time to conform to the constant need for improving the management system.

The process superintendent is charged with the customary responsibility for all manufacturing operations from receipt of crude to shipment of products. His staff includes coordinators and technical assistants

Individual responsibility for the several divisions of processing are delegated to subdepartment heads in charge of steam and power, chemical products, oil movement and storage, miscellaneous processes, and the primary distillation and cracking operations. Department heads are aided by administrative staffs and technical assistants as required.

The mechanical department, maintaining a similar staff organization, has grown rapidly in size and importance. Maintenance of the entire



This Produc-Trol board, posted in the mechanical superintendent's office, shows both daily and monthly figures on mechanical manpower distribution. Long-term goals for construction and maintenance categories are marked by vertical lines. Detailed distribution of all men in the department is posted currently in the file panel at the left

ACCOMPLISHED....

Organization at Esso's Bayway plant illustrates method of administering a complex operation

physical plant comprises the greatest routine responsibility in that department. Since much of the new construction and modification at Bayway is being performed by company personnel, construction now occupies a major share of attention in the expanded mechanical department.

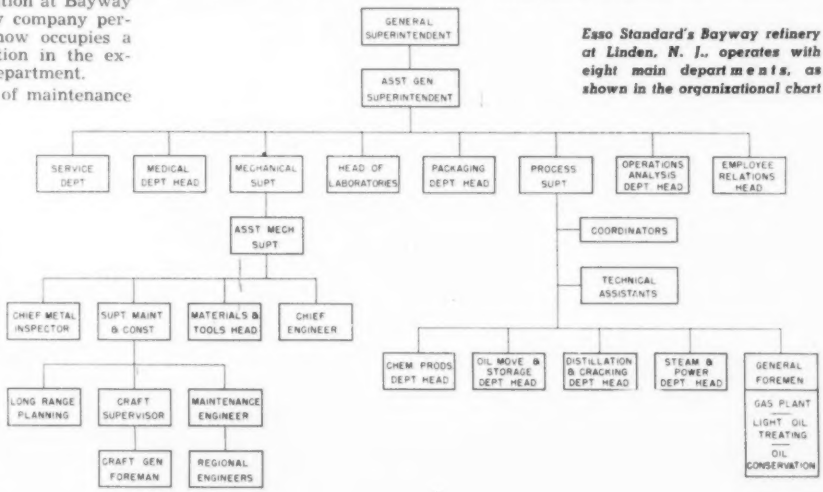
The superintendent of maintenance and construction coordinates the work of the maintenance engineer and his regional engineers with the craft supervisors and a long-range planning section. All company engineering for both construction and maintenance is performed in the chief engineer's department. There, requirements of new and existing units are transformed into plans and specifications for the guidance of the superintendent of maintenance and construction. Material estimates prepared under the chief engineer guide the head of the materials and tools department whose duties of procurement and storage are currently of great importance.

The laboratory, employe relations, medical, and packaging departments conform generally to the accepted administrative duties in refineries. Product control is the principal function of the chief chemist and his refinery laboratory, although some research is conducted in collaboration with the affiliated Standard Oil Development Co.

In three departments, administration is responsible jointly to the general superintendent and higher administrative echelons. A technical superintendent in the manager's office of the New Jersey Works is concerned directly with operations of the refinery laboratories and an operations analysis department. The latter comprises technically trained engineers who assemble and study data on operating units to assure that accounting records truly reflect costs and yields. Their duties include a constant study of plant operations. They conduct engineering tests designed to increase capacity, improve product quality, and reduce costs.

A chief metal inspector, coordinating periodic tests of refinery units with the mechanical superintendent, is responsible indirectly to the New York safety department which implements company safety policy in all plants.

The normal flow of information in the form of reports and directives passed through strict administrative channels suffice to conduct fixed, routine operations at the Bayway refinery. But a much more flexible means of communication among the numerous departments is required to asure full coordination of current work. This is well accomplished by a system of brief scheduled meetings held daily, weekly, and monthly as



Esso Standard's Bayway refinery at Linden, N. J., operates with eight main departments, as shown in the organizational chart

required. These meetings include personnel of all administrative levels. They bring together parallel departments and make possible the rapid collection of information which guides higher echelons, and prompt dissemination of orders and requirements upon which department subdivisions must act. They eliminate bottlenecks through exchange of information directly between departments rather than through the next higher administrative level.

All meetings focus on a weekly session held each Monday morning with the general superintendent in charge. Present are all primary department heads, the mechanical superintendent, and the assistant mechanical superintendent, a technical assistant to the process superintendent, and the heads and assistants of the steam and power, chemical products and distillation and cracking departments. The New Jersey Works general manager's office is often represented, as are various coordination and laboratory groups.

Operation Plans Reviewed

At this meeting, the broad field of operations is discussed. The operating plans for the coming week are reviewed and fixed. The outlook for future operations is projected as far as feasible. The status of important construction is reported and plans for incorporation of new units are furthered. Maintenance projects are planned in general and dates for important shutdowns and turnarounds are fixed. Employe relations are given attention. Over-all schedules of crudes to be run are discused. To this weekly plant-wide meeting are brought the requirements of both higher and lower echelons. From the session, all concerned take back to their respective departments, the instructions and information which will guide their operations not only during the coming week, but for weeks in advance.

Contributing to the weekly refinery meeting are daily sessions in the more important departments, so staggered that recorded minutes are mutually available on a day-to-day basis for exchange of information concerning operations of less than plant-wide importance. At 11:30 a.m. each day the maintenance engineer meets his regional engineers. During the half-hour meeting, discussion covers status of all major construction and maintenance projects, new tradesmen required, and shutdown and turnaround dates.

The minutes of the regional engineers' meeting are available to the process superintendents' meeting which follows daily at 12:00. Heads of all subdivisions except chemical products, together with their subordinates down to and including general foremen, and representatives of operations analysis are present. They discuss any changes in crude runs, yields, specifications, and disposition of products, and fix the operating plan for the next 24-hour period. Shutdowns and turnarounds as agreed to by the mechanical department are discussed a week ahead of actual dates. The chemical products department holds its own meeting simultaneously.

Daily at 1:00 p.m. minutes of the three previous meetings are made available to the mechanical general foremen who meet with the mechanical superintendent, the superintendent of maintenance and construction, and craft supervisor. There, tradesmen of the various crafts are assigned jobs, material and tool deliveries are fixed, and labor and material requirements for the near future are determined. Employe relations occupy an important part of discussion at that level. These four brief daily meetings translate immediate plans into action. At the same time they form the basis for much of the action taken in the weekly refinery meeting.

During the current construction program, the mechanical department division heads meet weekly with long-range planners to discuss requirements of labor, materials, and tools over as long a range as possible. There, priorities for labor and materials are set and metal inspection and turnaround dates determined. A similar weekly meeting is held with the process department heads.

As required, lower-level sessions are held under the direct charge of regional engineers to plan maintenance projects. Given the date of a turnaround, the regional engineer concerned meets with all foremen on the job and process unit representatives. The required men of each craft are assigned, tools and materials ordered, and a time table showing the sequence of the entire operation is drawn up. Blanking of all lines and vessels is coordinated with process personnel and downtime is fixed to the minute. Turnaround meetings began with major projects like the catalytic cracking unit and have proved so successful that they are being expanded to include periodic maintenance and inspection of thermal cracking and other units. Prior planning carried to this extent has resulted in a reduction of 30 per cent in man-hours required for such maintenance work.

A second general superintendent's meeting has been held each month since the refinery expansion program began. Called near the middle of the month immediately after release of the appropriation status report, it brings together all engineering supervisors, planning groups, division heads concerned with construction, and representatives of outside contractors engaged in construction at the plant. Attention focuses on a wall-size chart in the superintendent's office, on which are listed down the left margin, all projects included in the current expansion program.

Division of Project

Each project is subdivided into three phases: engineering, materials, and construction. Across the top of the chart are plotted the days and months covering the expansion program. By means of colored tape, the status for all three phases of each project is shown; estimated completion dates, present status whether completed or not, and if not, the amount of lead or lag ahead of or behind schedule. Planning groups report on material delivery and outlook for the future. Engineering groups report progress in groundwork on important projects. At this high-level exchange of data, priorities are shifted, final completion dates are coordinated, and completion date improvements sought. A coordinator of new construction presides and issues a monthly progress report based on results of each meeting.

This system of meetings developed gradually at Bayway as its effectiveness became increasingly evident. On daily meetings, one-half hour is considered a maximum; duration being determined by actual business at hand. Thus the meetings remain functional and avoid becoming burdensome bull sessions to busy department heads. The rapid means of communication from top-level executives to laborers in the plant was found to expedite action not only on decisions of the former, but on complaints and suggestions originating with the latter class of employes.

In addition to scheduled meetings at Bayway, the current construction program requires many inspections and sessions in the plant, such as this one. Left to right: J. E. Grady, regional engineer; J. R. Eilfe, general superintendent; G. F. Eustis, acting assistant general superintendent, and D. I. Watkins, acting assistant mechanical superintendent

Basic Interpretation of X-Ray Photographs . . . of pipe-line field welding

by R. R. Hughes*

EVIDENCE of what is accomplished by the X-ray inspection of field pipe-line welding frequently has been requested throughout the industry during the past few months when the X-ray method has been applied during the construction of two large systems. This article shows how flaws have been detected in welding big-inch pipe under actual construction.

The flaws would not have been discovered by the usual visual methods of inspection. While field welding of pipe lines has been remarkably satisfactory up to this time, nevertheless, the magnitude of the investment in big-inch programs planned for the immediate future may warrant systematic X-ray inspection in order to insure that high standards of welding may be maintained continuously to meet modern exacting requirements.

During the past year, the X-ray equipment and methods originated by Industrial X-Ray Engineers have been employed to examine welding on more than 900 miles of natural-gas line and 700 miles of crude-oil line. The use of big-inch pipe, plus the factors of public safety and lowered maintenance costs, may make X-ray welding inspection a permanent part of pipe-line construction.

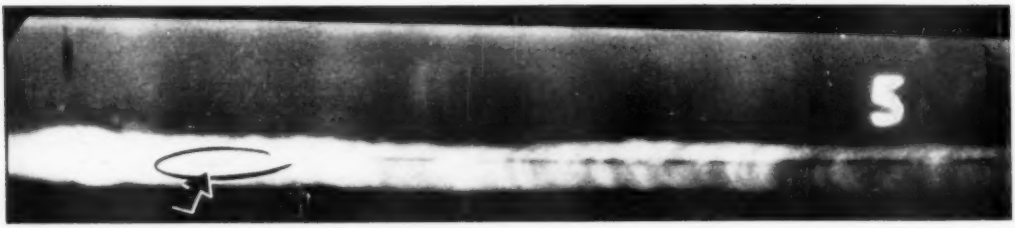
To evaluate accurately the indications contained on an X-ray film of a pipe-line weld, the following simple fundamental principle of X-ray theory should be kept in mind in connection with the inspection procedure. The film is exposed by being placed on one side of the weld, with the source of radiation being on the other. Radiation penetrates through the metal in between, and exposes the film. A greater quantity of radiation penetrates through areas of lesser metallic thickness which causes the film to accumulate greater exposure at those points.

Thus, after developing, the X-ray negative is a shadow picture of the weld. It portrays defects and conditions which lessen cross-sectional dimensions. They may be identified on the film as areas which differ in density from those areas where the cross-sectional dimensions are uniform. Weld conditions creating granular changes in the metal, such as embrittlement, however, are not indicated on the X-ray film.

Any weld condition which produces a hole, gap, or irregularity in the metal, such as the occurrence of slag,

*Chief engineer, pipe-line division, Industrial X-Ray Engineers, Tulsa

Fig. 1—(A) Truck-mounted equipment, including dark room and generator, during operation of inserting X-ray unit in the open end of the pipe prior to traveling inside to welds to be photographed. (B and C) Operation of inserting X-ray unit. (D) Self-propelled unit driven by a ½-hp., 220-volt motor, connected by cable with a generator mounted on the truck. (E) Control of the unit in the pipe is handled by a panel near the open end. A signal light on the panel indicates when the unit passes welded joints while traveling through the pipe. (F) X-ray film encased in a lightproof envelope is wrapped completely around the joint to be inspected. The traveling unit is stopped at a weld, the exposure is made, and the film is developed in the dark room on the truck in 25 minutes



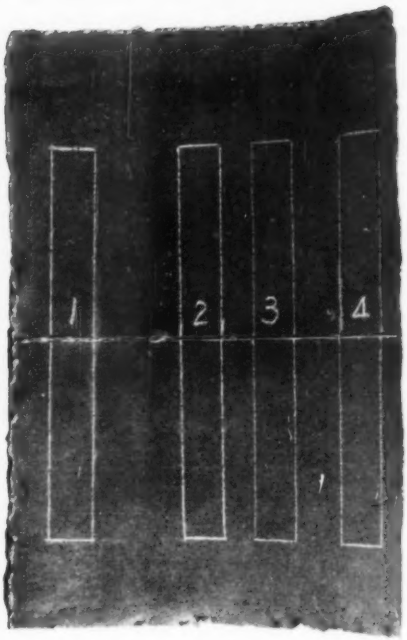


Fig. 2—(Above and left) Both the photograph of the weld surface and the X-ray photograph show that there was incomplete penetration in the application of the stringer bead throughout the full length of the weld extending across the specimen. Furthermore, the gap between pipe ends had not been wide enough to permit good workmanship. A slag inclusion of about an inch in length is marked by a circle and arrow on the X-ray photograph

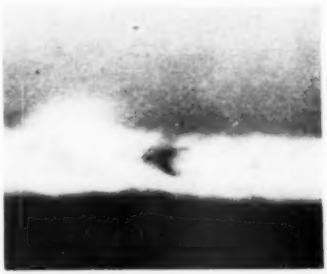
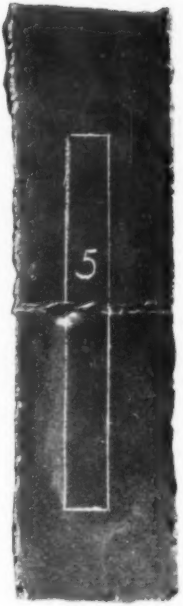


Fig. 3—(Above and right) The "burn through" and resulting crater formed on inside of pipe may be seen. X-ray photograph shows that crater is not actually gently rounded in way that it appears in visual inspection for crater is clearly elongated, coming to a sharp point at one end where it produces a natural stress concentration point inducive of crack propagation



porosity, or undercut is definitely registered on the film when good radiographic procedures are employed. The following defects common to arc-welding are all readily revealed by X-ray inspection: (1) incomplete penetration; (2) lack of fusion; (3) gas holes; (4) porosity; (5) low crown; (6) undercut; (7) slag inclusions; and (8) cracks. A positive record of the surface appearance of the weld is also obtained. Characteristics such as width and buildup of the weld can be ascertained definitely from the film.

Because of the conditions of radiography, a crack will show up much sharper on the completed film when the X-ray tube is placed so that the radiation can travel the full course of the crack depth before striking the film emulsion. Laminations in steel plate which run at right angle to the radiation beam (parallel to the plane of the film) will not register at all.

X-ray Film Interpretations

The following terms describing film characteristics are commonly used during discussion and interpretation: definition, density, and contrast. All three are functions of film quality.

1. **Definition** is a measure of the film's ability to indicate minute defects. The effective use of this feature depends to a great extent on both the operator's skill and the equipment used.

2. **Density** is the term for describing the amount of exposure on the film; or in other words, the degree of "blackness" which has resulted from exposing film emulsion to radiation. The density of an exposed film may be altered radically by incorrect processing procedures.

3. **Contrast** is the sharpness of differentiation between areas of varying density on the same film.

Variables, such as thickness of steel, wave length of radiation, types of film and chemicals used, positioning of source of radiation, and temperatures affect the ultimate film quality. The know-how of the operator and use of adequate equipment are essential for dealing with these variables which may affect the uniformity of radiophotographic records.

Typical Case Histories

The accompanying data and photographs are not intended to illustrate what should be accepted or rejected in a weld, but are intended to serve as a means for identifying certain defects when they appear on an X-ray film. Complete interpretation comes with experience and can only be accomplished when the negative viewer has full knowledge of the welding procedures and metals used.

The accompanying illustrations consist of photographs of the surfaces of coupons and X-ray photographs of welds of these coupons. In Figs. 2, 3, and 4 the X-ray photograph is above the photograph showing coupon-surface appearance.

All the photographs are marked to

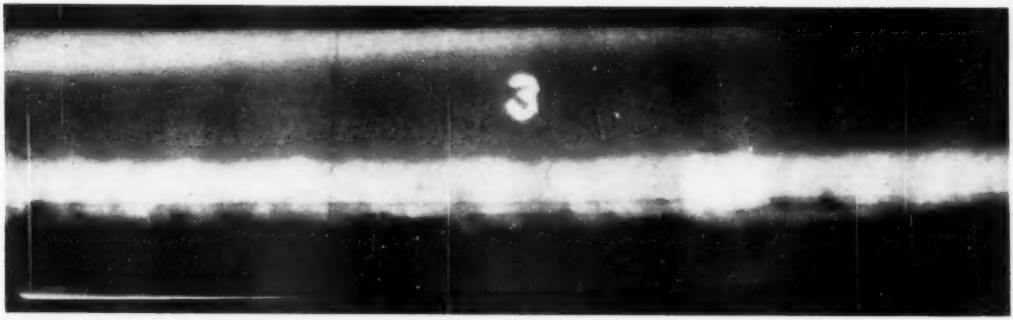


Fig. 4—(Above and left) High-low pipe or improper line-up. It will be noted in X-ray photograph that density of the film on one side of weld is higher than it is on the other. This is due to butt jointing two different thicknesses of pipe wall

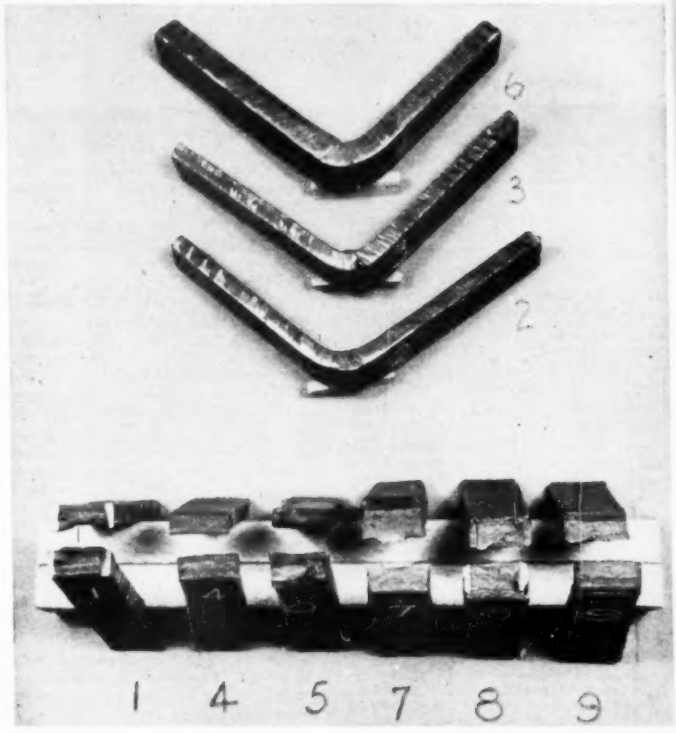
der to extract the information contained. Scattered indications may readily reveal whether: (1) pipe ends were properly prepared, (2) gap between pipe ends was suitable for a good stringer bead, (3) skill of the welder in any particular position was adequate.

X-ray negatives may even show whether welding rod used was as specified. A damp rod leaves a record of its particular characteristics as does the condition of a welder's nerves. Properly used such information can be of much value in improving overall job efficiency and it provides a unique welding control not attainable by other methods.

The X-ray equipment used in pipeline field inspection is specially built to meet the needs of this type of service. While the principle of the unit is much the same as that of those

(Continued on page 66)

Fig. 5—Appearance of straps after physical testing. Note slag in strap No. 1 and incomplete penetration of stringer bead in strap No. 8



show where cuts were made to obtain the straps illustrated in Fig. 5. Physical test data appear below:

Strap (or test coupon) No. 1—nick break (note slag); **strap No. 2**—face bend, 90°; **strap No. 3**—back bend, 70°; **strap No. 4**—tensile, 26,500 psi.; **strap No. 5**—tensile, 22,500 psi.; **strap No. 6**—face bend, 90°; **strap No. 7**—back bend, 10°; **strap No. 8**—nick break (note incomplete stringer); **strap No. 9**—tensile, 24,000 psi.

Specifications on both steel and welding rod used were such that these welds should have withstood at least 60,000 psi.

Closer examination of the X-rays will reveal the outside surface appearance of the weld as outlined by areas of low crown, higher buildup, width of weld and weave pattern. X-ray negatives are all revealing and warrant the same kind of study that would be given to a blueprint in or-

by George W. Miller*

ABC's of Lubricating Greases

THE consumer very often uses the terms high-temperature grease and high-melting-point grease, or low-temperature grease and low-melting-point grease, synonymously. It is believed that these terms should be clarified and well understood. High and low-melting points are relative and optional temperatures. Where does high and low-melting point begin and end? It may be that low-melting-point greases are those whose melting points are around 200° F. and high-melting-point greases those above 300° F. This may be obvious to the grease manufacturer but the average consumer does not know whether 195° F. is low and 210° F. is high for a given type of lubricant.

As a good instance, when speaking of a calcium-soap grease one is likely to term it high-melting-point grease when he means 215° F., whereas if he is speaking of a sodium soap he may mean plus 350°. The melting point is only of interest to the grease manufacturer or consumer for control purposes as well as to identify types of soap that may be in a grease.

The consumer has little interest in this other than an aid to determining the proper type of grease to choose, as very few industrial applications operate close to the melting point of the greases offered for high-temperature or low-temperature operation. Lower-melting-point grease may be used above 200° F. if provisions are made for rather frequent regreasings and cleanings. High-melting-point greases may be used as high as 400° F. or over where the high temperature is intermittent, such as the wheel bearings of buses and trucks or some industrial applications.

In general, a grease with a melting point above 300° F. is satisfactory for most high-temperature-grease applications, again depending upon the frequency of application and periods of operation. It may therefore be said that differences in melting points of greases for high or low temperatures are a characteristic of a particular grease and may have little to do with high-temperature-grease or low-temperature-grease performance in service.

*Battenfeld Grease & Oil Corp. of New York, North Tonawanda, N. Y. Paper presented at fourth annual convention of A.S.L.E., New York, April 11-13.

Grease Classifications

Lubricating greases are produced in many types and forms, some very simple in formulation and some highly technical and complex. The types in general use for average lubrication requirements may be placed in four general classifications.

1. Water-resistant type for applications from below zero to approximately 180° F. operating temperatures. This classification takes into consideration generally calcium and aluminum-base greases.

2. Water-soluble type for applications from average operating temperatures above freezing to temperatures ranging up to 300°-400° F. and over—generally the soda-base greases.

3. Multipurpose greases—water-resistant types—covering both low and high-temperature applications.

4. Greases using synthetic fluids in place of natural mineral oils.

Generally the water-resistant-type grease (Classification No. 1) are calcium and aluminum base. The normal calcium-base grease is produced by the saponification or cooking, with steam or open fire as a heating medium, a soap base composed of whole fat such as tallow, or fatty acids, with lime and water. After this soap is completed, the chosen mineral or lubricating oil is slowly added along with the required amount of water to form the necessary emulsion of soap and oil—the total amount of mineral oil added to the base determining the body or consistency of the finished grease.

Using the N.L.G.I. numbering method, a No. 1 grease of course will be the softer grade, whereas the others increase in body as the numbers rise. A No. 1 grease normally will run approximately 90 per cent lubricating oil, water up to 2 per cent, about 10 per cent soap with worked penetration of 310-340 while a No. 5, which is a very stiff grade, may run 25-30 per cent soap, water up to 2½ to 3 per cent, and the remainder lubricating oil with worked penetration 130-160. The viscosity of the oil of course may run anywhere from 30-35 seconds Saybolt at 100 to 5,000 or over, and the viscosity index from below 0 to 100 plus. The use to which the grease is to be put will of course determine its body or consistency and the viscosity and viscosity index of the lubricating oil used in it.

Assuming that only quality fats of the proper type and well-refined lubricating oils are used, the selection, then, of a calcium grease is governed by a few fundamentals; namely, the temperature at which the grease is to operate, the type of bearing, the speed of the bearing, the clearance, the pressure, and the frequency of lubrication.

For temperatures below freezing and below zero, a very light-viscosity, high-viscosity-index lubricating oil should be used, averaging anywhere from 35 seconds to possibly 300 seconds at 100 and above 70 viscosity index. Where temperatures are generally above freezing, a heavier-viscosity oil is more desirable and high viscosity index of the oil of less importance. Likewise the size and speed of the bearing and pressure involved also determine the viscosity of the oil and the consistency of the grease. It is safe to say that for normal requirements, the viscosity of the oil in a lubricating grease for a given application should be about the same as if straight oils were used. Lubricating grease is in reality a jelled oil and it is actually the oil that is doing most of the lubricating, although aided by the soap, and is kept in place by the soap from which the grease is produced.

Generally speaking, in selecting

HORTON HEMISPHEROIDS
cut evaporation losses at
ESSO MARKETING TERMINAL

The Esso Standard Oil Co., (Chile) S. A. C., wanted to reduce evaporation losses at its Antofagasta, Chile, marketing terminal. To do this, the company installed two Horton Hemispheroids, one for the storage of aviation gasoline and one for motor gasoline. The annual throughput at this plant of motor fuel and aviation gasoline is 170,000 bbls. and 7,500 bbls. respectively. Daily temperature changes at Antofagasta are relatively small and the temperatures are fairly uniform. Despite this, the switch to storage in Hemispheroids resulted in a material decrease in evaporation losses—as shown by comparative figures in the tables below.

Noded and Plain Hemispheroids are available in capacities from 2,000 to 25,000 bbls. at working pressures of 2½ and 5 pounds per sq. in. Write our nearest office to obtain the complete engineering data contained in Bulletin E.

Evaporation Loss—Per Cent of Throughput

1948	MOTOR GASOLINE Monthly	MOTOR GASOLINE Accumulated	AVIATION GASOLINE Monthly	AVIATION GASOLINE Accumulated
January	0.03	0.03	1.25	1.25
February	0.36	0.23	2.17	2.83
March	1.67	0.62	1.59	2.40
April	0.61	0.72	2.03	3.93
May	0.39	0.72	1.65	3.08
June	0.32	0.70	0.62	2.94
July	0.57	0.76	0.07	2.64
August	0.11	0.71	0.24	2.24
September	0.06	0.65	0.003	1.67
October	0.13	0.61	0.18	1.65
November	0.19	0.59	0.26	1.53
December	0.004	0.54	0.55	1.77

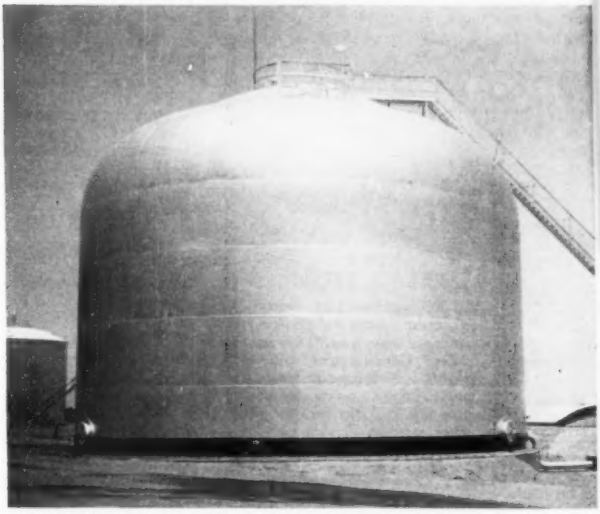
The above table shows monthly and accumulated evaporation losses from motor and aviation gasoline stored in Noded and Plain Hemispheroids now in use at the Esso terminal.

Above: 10,000-bbl. Plain Hemispheroid used for storing aviation gasoline at Antofagasta.

Evaporation Loss—Per Cent of Throughput

Month	Year	Monthly	Accumulated
July	1946	0.114	0.114
August	1946	1.36	1.215
September	1946	1.895	2.327
October	1946	0.399	2.488
November	1946	1.1284	2.245
December	1946	1.921	2.802
January	1947	0.58	0.58
February	1947	1.34	1.74
March	1947	1.78	2.41
April	1947	0.097	1.58
May	1947	1.33	2.37
June	1947	0.9	2.83
July	1947	1.36	3.45

The chart above shows monthly and accumulated evaporation losses from aviation gasoline when stored in an 8,000-bbl. cone-roof tank at Antofagasta.



20,000-bbl. Noded Hemispheroid for storing motor gasoline at Antofagasta.

CHICAGO BRIDGE & IRON COMPANY

Plants in BIRMINGHAM, CHICAGO, SALT LAKE CITY and GREENVILLE, PENNSYLVANIA

Atlanta, 3.....2154 Healey Bldg.
Birmingham, 1.....1536 North 50th St.
Boston, 10.....1025-201 Devonshire St.
Chicago, 4.....2128 McCormick Bldg.
Cleveland, 15.....2204 Guildhall Bldg.
Detroit, 26.....1514 Lafayette Bldg.
Havana.....402 Abreu Bldg.
Houston, 2.....2119 National Standard Bldg.
Los Angeles, 14.....1523 General Petroleum Bldg.
New York, 6.....3347-165 Broadway Bldg.
Philadelphia, 3.....1615-1700 Walnut Street Bldg.
Salt Lake City, 1.....1525 First Security Bank Bldg.
San Francisco, 11.....1254-22 Battery Street Bldg.
Seattle, 1.....1325 Henry Bldg.
Tulsa, 3.....1606 Hunt Bldg.

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Nalco RESPONSIBILITY

. . . How it Guarantees Water Treatment Results in Your Plant

The NALCO STORY

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WHEN your plant water treatment is under the Nalco System, Nalco Responsibility is positive assurance that no opportunities for water treatment economies will be overlooked . . . It represents *security* to thousands of plant operators—who know, from long experience, they can be certain that the best water treatment chemicals and methods are permanently on the job with the *best interests of* Nalco System *users* always foremost.

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calcium greases keep in mind that for very low temperatures a very light-viscosity, high-viscosity-index oil should be used; for average temperatures a medium-viscosity oil—perhaps in the S.A.E. 20-30 range; and for higher temperatures and pressures reaching the maximum safety for calcium greases, oils in the S.A.E. 50-70 range or even higher with medium-range viscosity index should be used.

Selection of consistency and oil viscosity depends, also, on the speed of the bearing and the design of the bearing, whether sealed or open and whether sleeve-type or antifriction. For open-type, sleeve bearings, heavier oil viscosity and consistencies in the No. 2 and No. 3 range are preferable. For sleeve-type bearings, well sealed, No. 1 and No. 2 consistencies are preferable. Where dirt, dust, and water are encountered, the heavier body grease is preferred because of its better sealing ability. For antifriction bearings, the medium-viscosity oils are preferable, and for normal speeds the No. 1 and No. 2 consistency range; for higher speeds and temperatures, No. 2 and No. 3 consistency, and higher-viscosity oil, keeping in mind not to overfill the bearings at any time.

The most important factor to keep in mind when selecting a calcium-soap grease is that the normal calcium-soap greases are generally not safe to use for extended periods of time where operating temperatures will cause rapid evaporation or loss of the water content of the grease. The reason is very simple. Calcium-soap greases normally are a mechanical mixture or emulsion of soap, oil, and water. Elevated temperatures tend to evaporate the water, which acts as a binder of the soap and oil, allowing the oil to separate readily, and bleed away from the bearing leaving behind a heavy, sticky mass of soap, which soon causes difficulty, especially in antifriction bearings which normally are not lubricated as often as the sleeve-type bearing.

Alleviating Separation Difficulty

Where temperatures in an elevated range are consistent or extremes of temperature from low to high are encountered and it is desired to use calcium grease, possibly due to water resistance and ease of application, some of the difficulty due to separation can be overcome by frequent greasings, flushing out the old grease, and replacing with new and fresh grease.

The type of fat used in the production of a lime-soap grease also determines its utility at elevated temperatures. As a rule, grease manufactured from fatty acids will give better service at elevated temperatures than grease produced from whole fats. There is less tendency for bleeding or oil separation when using the fatty-acid soap-type grease compared with the whole-fat soap-type grease.

The viscosity index or so-called quality designation of the lubricating oil is not too important except for very special applications, such as operating at constant elevated temperatures, as an aid to oxidation resistance or where shelf storage becomes a factor. It is of more importance when the grease is to be used at cold temperatures below freezing and well below zero where reduction in starting torque and bearing movement are of course necessary and desirable.

The color of the grease has nothing to do with its ability to perform or not to perform, provided refined oils are used, and is mainly psychological to the user. Normal greases are not dyed but obtain their color from the color of the lubricating oils and fats used in their production. In some rare instances, dyes are used to color greases as a brand identification.

Calcium-base or calcium-soap greases are good low-temperature lubricants and when we speak of low temperature we mean temperatures from possibly freezing to well below zero.

Low-Temperature Grease

In selecting a calcium grease for low-temperature lubrication, viscosity, viscosity index, and pour point of the oil used in the grease are extremely important. Consistency and soap structure follow. The proper type of fat must be used for best results and the water content must be reduced to a trace. Such greases are available for low-temperature lubrication. However, they are not recommended for use where the conditions, although involving a period of very low-temperature operation, may also involve periods of high-temperature operation, too. This is because of possible physical change of the grease due to moisture loss, of which there is only a trace to start with, and extreme thinning and evaporation tendency of the light viscosity oils generally used in this type grease.

The second type of grease in classification No. 1 is aluminum-soap grease. These greases are very similar to calcium-soap greases in their general structure and physical characteristics. The manufacture differs somewhat from calcium-soap grease, although the general procedure is the same. Melting points are in about the same range with calcium-base greases although aluminum greases can be used at slightly higher temperatures due to the fact that they are water-free and will not separate due to loss of moisture. However, care must be taken when aluminum greases are to be used over an extended period of time at temperatures near their melting point and then allowed to cool quickly—the reason being that aluminum-soap greases when cooled quickly have a tendency to set up into a stiff jell structure that will no longer wet metal surfaces, with consequent loss of lubricating value. This occurrence or phenomenon can be overcome by frequent periods of lubrication, especially directly after shutdown.

While highly water resistant, there is a tendency for aluminum-base greases to be hygroscopic and hence to soften due to absorption of water either through contact in operation or from the atmosphere. They are not quite as good from a low-temperature standpoint as calcium greases, and are more difficult to handle through pumping equipment at low temperatures, especially temperatures below zero. Due to the higher cost of both production and raw material involved in aluminum-soap greases, they would, from a cost standpoint, be a secondary choice to calcium greases for the same type of work. The absence of water and type of soap produce a transparent lubricant which has some advantage where nonstaining is a factor.

Aluminum-soap greases do have an advantage over some types of calcium greases due to the fact that there is slightly less tendency for them to bleed oil and, therefore, for lubrication where some oil bleeding or capillary action would be detrimental—as in the lubrication of instruments, some canning equipment, certain textile machinery—aluminum-soap types may prove more satisfactory. Aluminum greases are also extremely satisfactory for slow-moving chains or cables operating directly in scalding water such as found on bottle-washing machinery. The temperature is such that the jell stage is maintained and some lubrication is effected.

Fiber Grease

Classification No. 2 covers the normal soda base or what is sometimes known as sponge or fiber grease. Like calcium grease, this type product is manufactured from whole fats or fatty acids, water, and lubricating oil; but caustic soda (sodium hydroxide) is used in place of lime. The manufacture of soda-soap grease is very similar to that of calcium. Soda grease differs from calcium grease in that it is more nearly a chemical or colloidal mixture of soap and oil and does not depend entirely on its water content to maintain its jell or grease structure; in fact, the lower the water content in a soda-base grease the better the grease. An excess of water generally causes the grease to become soft and lose its normal consistency under operating conditions, or storage. The name sponge or fiber is not derived from the addition of fillers in the grease but from its appearance, resulting

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By A. C. Johnson

Assistant Superintendent
American Liberty Oil Company
Mount Pleasant Refinery

An increase of about 10 percent in the overall gasoline production of our Mount Pleasant refinery has been realized without running additional crude by the installation of a non-selective catalytic polymerization plant. This unit utilizes UOP solid phosphoric acid polymerization catalyst for converting the propylenes and butylenes in the total cracking plant gas to hydrocarbons boiling in the gasoline range.

A. C. Johnson

A poly plant was first planned in 1941, but consideration was dropped during the war when practically all of our output was directed to the manufacture of fire bombs.

Because of vastly improved markets and the need for higher octane numbers, the project was revived in 1946 and Universal Oil Products Co. was asked to make a survey. As a result, UOP was called upon for all design and processing work, while American Liberty engineers conducted all architectural and layout work with UOP acting as consultant. All new vessels except the catalyst case and deethanizer tower were fabricated by the refinery with existing equipment being used wherever possible.

Design Capacity 2,160,000 cu. ft.

The design capacity of the poly unit is 2,160,000 cu. ft. of fresh cracked gas per day representing the total gas produced by the UOP thermal cracker. The quantity of polymer gasoline produced depends upon the amount of gas available for processing, and this in turn, depends upon the operating schedule of the cracking plant. At design capacity, the poly unit will produce 235 b/d of 10 pound polymer gasoline. During the past year, however, it has been advisable to operate the cracking plant for maximum throughput of gas oil rather than for maximum yield which has limited the poly yield to an average of 170 b/d.

Shut down on April 4 of this year, after its first run of 195 days actual on stream time, the poly unit showed a total output of 1,263,765 gal. or 81 gal. per pound of catalyst.

The polymer gasoline produced has a clear Motor Method and a clear Research Method octane number of 82.5 and 97 respectively with blending values substantially higher. The high octane blending value, both motor and research, makes this product very valu-

(Advertisement)

able in raising the overall level of the refinery's gasoline. By blending with cracked gasoline and selected straight run materials, the octane rating of premium gasoline can be raised two octane numbers, or a given octane reached with approximately half the lead formerly required.

Gas from the cracking plant absorber is compressed in the low stage of the compressor, and together with the high pressure gas from the cracking plant stabilizer, is sent to the treating section operating at 150 psi. Having about 1,200 grains of H_2S per 100 cu. ft. and fairly high mercaptan content, the gas first enters the Girbitol unit where H_2S is removed down to 25 grains. In the H_2S scrubber the last traces are removed by caustic. Mercaptans are extracted in a regenerative caustic system.

The sweet gases are then compressed in the high stage to 500 psi, and heated to 380° F. by first exchanging heat with catalyst tower effluent and then through a heater using hot oil from the cracking unit as a heating medium. The hot gas enters the top of the catalyst chamber where contact is made with the catalyst, which is arranged in five beds with a total charge of 15,000 pounds. Proper hydration of the catalyst is controlled by the addition of water and the reaction temperature of each bed is controlled by using liquid propane as a quench.

Operating Data

Operating data for the catalyst tower is as follows:

Pressure, psi	450
Temperature, Gas in, °F.	380
Temperature, 1st Bed, °F.	410
Temperature, 2nd Bed, °F.	420
Temperature, 3rd Bed, °F.	425
Temperature, 4th Bed, °F.	430
Temperature, 5th Bed, °F.	435

After the polymerizing action of the catalyst, the effluent from the catalyst chamber is cooled and gas is removed from top of the catalyst tower effluent receiver. This gas goes to the poly absorber where recoverable light ends are picked up and returned to the cracking plant fractionator. The liquid from the receiver is then charged to the deethanizer.

With adequate cooling and subsequent low deethanizer receiver temperature, maximum propane recovery is possible. A small amount of propane, together with the ethane and lighter gases, is taken overhead to fuel, and bottoms are charged to the depropanizer. The depropanizer, operating at 275 psi produces specification propane overhead, the bottom being charged to the debutanizer. From the bottom of this vessel poly gasoline at specified Reid vapor pressure is removed with all excess butane going overhead to storage.

Today the American Liberty Mount Pleasant Refinery has a crude capacity of 13,000 barrels, thermal cracking capacity of 4,000 barrels, and facilities for the manufacture of asphalt and special naphthas, as well as the new poly unit.

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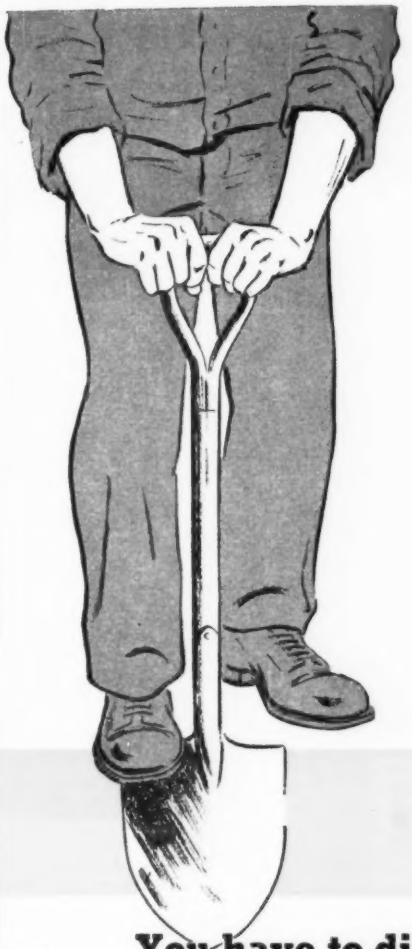

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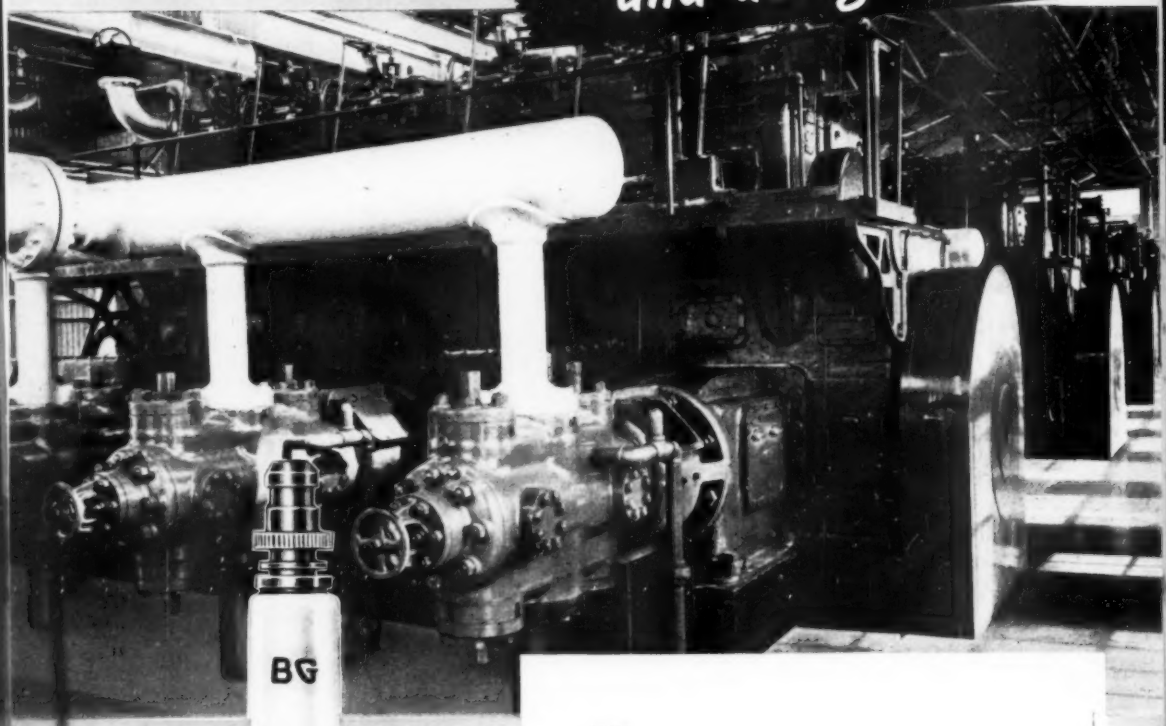

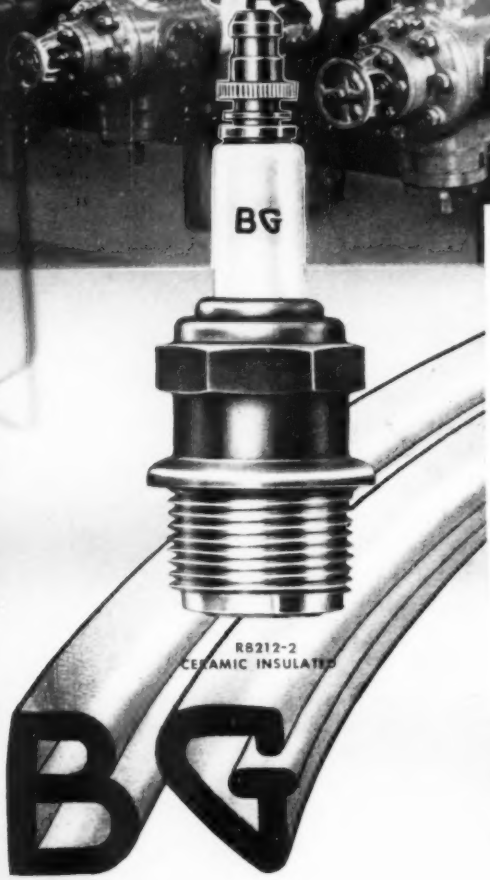

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from the method of manufacture and raw materials used.

Soda-base greases can be used as low-temperature greases depending upon the viscosity and viscosity index of the oil used, consistency, and type fats used to formulate the soap; although when using them as low-temperature greases, great care must be taken in their selection. Generally, below freezing and invariably below zero, even with light-viscosity oils, soda-base greases become very stiff and difficult to pump, creating high starting torques and in the case of small antifriction bearings preventing bearing movement entirely.

Taking into consideration the frequency of lubrication periods, the safe high-temperature limit of operation with a soda-base grease is very close to its actual melting or dropping point. Again, the proper consistency depends upon the size of the bearing, clearance, speed, pressure, operating temperatures and frequency of lubrication. The general outline for selecting a calcium grease can be closely followed for soda greases with the exception that soda greases are not so desirable at temperatures below freezing, do give satisfactory lubrication at elevated temperatures well above 300° F., and should always be questioned when used in contact with water or steam.

Another fact to take into consideration in the selection of a soda-base grease is its general structural appearance, whether a short, buttery type or a long, stringy, fibrous type. It is generally accepted that the short, buttery types of grease are most desirable for antifriction bearings and general sleeve-type bearing lubrication due to the fact that there is less resistance to shear in the short-fibered structure and less breakdown of the grease due to operation of the bearing. For bearings such as coupler type, universal joints, etc., where throwoff due to centrifugal force is a factor, the stringy, long-fibered types are most desirable; as the fibers tend to wind around the moving parts and thus resist throwoff.

Soda-base greases are, of course, normally water soluble. However, the solubility of soda-base greases can be varied depending on the type of fat used, the viscosity and type of mineral oil, and certain additives can also be used to decrease this solubility. Soda-soap grease can be modified to give some degree of water resistance.

In using a soda-base grease under elevated temperatures, care must be taken to choose a grease that will not bleed oil or thicken excessively due to oil evaporation. Therefore, it is necessary to determine the optimum temperature and speed at which a bearing will operate over a long period of time and then choose your grease accordingly. Keep in mind the fact that the lighter-viscosity and high-viscosity index oils will have a greater tendency to bleed under operating and storage conditions than the medium or heavy-viscosity oils of lower viscosity index.

Milled or Preworked Grease

Another important factor that must be given consideration in the selection of a grease lubricant, especially soda-soap greases, is the difference between its unworked and worked penetration which is a greater factor in soda-base than in calcium or aluminum-base greases.

The softer grades (No. 0 and No. 2 consistencies) of calcium or aluminum greases are not affected to a great extent by the action of a properly lubricated bearing. However, the heavier consistencies (Nos. 3, 4, 5 and over) do show a large range between worked and unworked consistency and must be taken into consideration.

Soda-soap greases differ, however, in that practically all consistencies will show a marked breakdown in consistency on working. To overcome this undesirable characteristic, greases of all types and especially soda-soap greases can be produced with higher than normal soap contents and then when cool, milled, or cold worked to the desired consistency for efficient bearing operation. This preworking adds hours of life to the lubricant—less frequent greasings are required—better sealing of the bearing is obtained—less tendency to bleed noted—and a lower shear and torque. However, there may be certain applications where an unmilled grease should be considered if it can be properly applied. It may be desirable to have the grease which is retained within the bearing break to a soft plastic forcing the stiffer unworked grease out to form a stiff shock-resistant seal.

Classification No. 3 includes the newer type multipurpose greases which are being marketed today under various trade names and produced from barium or lithium soaps.

The barium-soap grease in general use is of a short, fibrous nature in appearance, highly water resistant, with melting point ranging above 400° F. The fact that this grease has very little breakdown under working—the worked and unworked penetration reading about the same—puts it in the class of a multipurpose grease, as only one consistency is generally required, although various consistencies in this type grease are available for special purposes.

Barium greases have good operating characteristics over a wide range of temperatures from well below freezing to 400° F. or over. The grease is outstanding for high-temperature service. It will operate at temperatures higher than the indicated A.S.T.M. dropping point provided undesirable byproducts formed from its components at higher temperatures are removed by frequent application of fresh grease. This characteristic of barium grease is due to the fact that the product does not have a sharp dropping or melting point but is merely thinned down to a homogeneous fluid lubricant at elevated temperatures, remaining prastic enough to prevent dripping.

Lithium-soap grease is similar in utility to barium grease but differs in appearance and in some of its general characteristics. It is smooth and buttery like the calcium greases. Its melting point ranges about 350° F. and its low-temperature characteristics are somewhat superior to barium. The water resistance of lithium grease is not as good as barium grease and falls somewhere halfway between calcium and a good grade of soda-base grease. Its retention in the bearing also falls below that of the barium type. However, like barium, its ability to withstand breakdown under operating conditions, resistance to water, and general high-temperature characteristics fulfill the requisites necessary to classify this grease as a multipurpose lubricant.

At high temperatures more frequent greasing periods are necessary with lithium than with barium grease. The grease has a sharp melting or dropping point. It has the tendency at high temperatures, to become dry or lose its ability to wet metal surfaces and therefore must be used with some caution under certain heat conditions.

Classification No. 4 includes the so-called synthetic greases. These greases are produced by the use of normal types of soaps but the synthetic types of hydrocarbons are substituted for normal mineral oils. The greases in this classification have great possibilities in both low and high-temperature operations and are produced in both water-soluble and insoluble types, in many consistency and viscosity ranges of the fluids.

Where the lubrication problem is one of wide temperature variation, rapid oxidation, gumming, etc., the synthetic product will be of great interest although the cost at present is much higher than for normal mineral-oil greases.

Due to the extremely high viscosity index and low evaporation point of some of the synthetic fluids ideal low and high-temperature greases are produced. The high-temperature greases lubricate at elevated temperatures over extended periods of time without leaving a residual deposit usually found when using normal mineral-oil greases.

These so-called synthetic products are too new to discuss in detail at this time. They are available and in many instances are giving good service. They are coming to the front

rapidly not only as normal types of grease but possibly as the all-purpose or multipurpose lubricant of the future.

Value of Physical Tests vs. Performance

Conventional physical and chemical tests are excellent for controlling the uniformity in manufacture—and even for that purpose such controls have their limitations. Two greases with identical physical tests and of the same formulation will give different results when placed in a bearing under identical operating conditions. In addition to physical tests, there must be correlated performance tests that really give the right answers. A regular A.S.T.M. worked penetration taken at 60 strokes and 77° F. means very little as to performance. Only a slight value can be placed on this test if correlation is worked out between an unworked and worked penetration which may give some indication of the breakdown in structure during bearing operation, but this is only an indicative figure and cannot be relied upon as an answer to performance. Accelerated tests to give such answers have been set up and are proving of value in the selection of the proper lubricant for a specific operation.

A grease may do a satisfactory job in a bearing operating at 150° F. but may be a failure at slightly lower or higher temperatures. Accelerated performance tests will give the proper answer and aid in the selection of the proper lubricant.

The A.S.T.M. melting or dropping point, viscosity index of the lubricating oil, acidity, alkalinity, and the numerous other physical and chemical tests are all good indications and controls but in reality mean very little in the way of actual performance.

Additives for Lubricating Greases

For bearings operating at higher temperatures and heavier loads than normal, oxidation inhibitors and extreme-pressure additives are available. Under ordinary conditions oxidation inhibitors would seldom be called for in calcium or aluminum greases unless to protect in shelf storage or for extreme conditions. Such inhibitors are of greater importance in the higher-temperature ranges. Oxidation inhibitors also act somewhat as a stabilizer and rust preventive by possibly preventing the action of acid compounds that may be the cause of bearing corrosion.

For heavier than normal loads, there are many types of extreme-pressure additives available and some thought must be given to their proper selection. There are the straight sulfur compounds; combination of sulfur, lead, chlorine; chlorine compounds; phosphorous compounds and many others.

With a known load, speed, and bearing size it is not difficult to determine whether an extreme-pressure grease is required. Keep in mind that grease in itself has much greater load-carrying capacity than the oil it contains or the straight oil which may be used. For instance, an oil of 2,000 Saybolt seconds at 100° F. may have a load-carrying capacity of 6,000 to 8,000 psi. When added to soaps such as calcium, soda, aluminum, barium, lithium, and many others to form grease, the load-carrying capacity is greatly increased to a good factor of safety over the straight oil. However, there are times when still greater film strength is required and additives must be used.

In selecting the proper extreme-pressure additive, take into consideration bearing structure, composition, and atmospheric conditions. All of these will react on the chemical used. Wear factor is an important phase that can at times be traced back to the activity of the additive. The active sulfur or chlorine compounds are perhaps the most active in this regard and the leaded and inactive sulfur the least.

Some additives have a tendency to develop bearing corrosion under certain operating conditions—others, like sulfur, must be carefully chosen when used in nonferrous-type bearings. Some compounds give extreme-pressure value at all operating temperatures, while others develop their maximum capacity under heat conditions. These factors must all be kept in mind when specifying grease with extreme-pressure characteristics.

Fillers

Fillers are commonly used in many greases for special operating conditions. Such fillers as graphite, carbon black, mica, lead, zinc, and other metallic compounds find their way into special formulations to impart what we might term "solid lubrication."

Fillers of the above-mentioned types are desirable where extremely heavy loads and intermittent starting and stopping are encountered—or shock loads such as in steel mill roll bearings, rubber mills, etc. Starting torque and bearing wear are greatly reduced in such operations by the use of the so-called solid-type lubrication obtained through the use of fillers. The filler forms a solid film between the metal parts of the bearing and is not squeezed out during shutdown or shock.

Lubricant Application

Proper application is as important as choosing the proper lubricant. Frequency of lubrication periods is easily charted, if you give due consideration to the many factors involved and already mentioned.

Methods of application will determine somewhat the consistency. Grease cup and hand guns allow the use of heavier-bodied or unworked greases. Automatic greasing units call for softer consistencies for satisfactory operation.

Should the bearing call for a heavier body than the lubrication system will handle, a well-milled grease may be the answer.

Overlubrication is as dangerous as underlubrication. Do not force the bearing to do extra work, creating added heat and friction with possible lubrication and bearing failure.

Basic Interpretation of X-Ray Photographs

(Continued from page 57)

used for shipbuilding welding inspection and for medical use, the pipeline unit has been designed to include the following features: (1) provision for X-ray photographing at 360° band instead of flat photography with an X-ray beam; (2) light, compact construction suitable for a mobile unit so that it has a fraction of the weight and size of conventional equipment; (3) a special cable, transformer and control system are employed; (4) a motor-driven carriage which conveys the unit through the interior of the pipe at the speed of 40 ft. per minute.

While it is preferable to operate at distances less than 2,000 ft. from the pipe end, it is possible to operate as far as a mile.

Safety control is easily maintained by keeping people at a distance of 10 ft. from the point where the X-ray is operating. When the unit is not operating, the current is turned off so that the X-ray unit is entirely inactive thus avoiding the danger to personnel which can arise through the use of radium or other radioactive materials.

It is important to note, when comparing negatives obtained by the X-ray and the gamma-ray (radium) techniques, that the X-ray methods deliver a quality negative with definite advantages. Measured radiographically, the X-ray will show much sharper definition, greater contrast, and a density more conducive to complete interpretation. These are characteristics which have long been recognized; and suitable limitations are imposed, in boiler and hydroelectric penstock welding where 100 per cent radiographic inspection is required. In terms of production, an X-ray exposure requires only a fraction of the time necessary for a radium exposure of the same weld. This is important in pipe-line work when progress is essential.

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TABLE OF CONTENTS

	PAGE
Introduction	5
Section I. Installing, and Operating Wire Rope. Unreeling, uncoiling, spooling, fleet angle, sheaves and drums, break-in, smooth operation, lubrication, inspection, saving rope, abuses, when to get a new rope.	7
Section II. Selecting the Correct Wire Rope for the Job. Strength, flexibility, resistance to abrasion, crushing strength, dimensions, strands and rope construction, grades of steel, fabrication, type of core, lay, examples of orders, and where to buy rope.	23
Section III. Catalogue of Standard J&L Wire Rope Constructions	47
Section IV. Standard Fittings, Slings, and Splicing Service Available with J&L Wire Rope	67
Section V. General Recommendations for Ropes in Use on Standard Equipment	87

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QUESTIONS on TECHNOLOGY

by W. L. Nelson

Consulting Engineer

Why Not Hydrogenate Residual Fuel Oil?

Now that residual fuel oil is in oversupply, why not hydrogenate or treat it for gasoline production?—S.B.R.

If we could plan on an oversupply of residual fuel oil that would continue for many years without abatement, it would undoubtedly be economical to develop and practice hydrogenation of the fuel oil into light oils. However, the oversupply would have to be so definite that the market value of residual fuel oil was very low (perhaps one-fourth of the value of crude oil), so low that the cost of operating the hydrogenation plant could be sustained. It is obvious that residual fuel oil is a better charge stock for hydrogenation than is coal. Also, gasoline could be produced more cheaply from residual fuel oil than from oil shale, and likewise gasoline could probably be made more cheaply from fuel oil than from natural gas.

Thus, your suggestion that residual fuel oil should be converted to light oils is good except that we must be certain that it will for long periods of time be in oversupply. The gravity of the crude oils now being processed on the North American continent is probably about 34° A.P.I. An evaluation of such a crude oil is indicated in Table 1. Inasmuch as the Middle East crude oils also have a gravity of about 34° or slightly higher, Middle East oils will not seriously disturb the relative yields of gasoline and fuel oil now being obtained. However, Venezuelan crude oils and some Canadian oils have much lower gravities and should they be processed in large quantities, the oversupply of residual fuel oils would be further aggravated. As an example, typical yields for a 24° A.P.I. crude oil are indicated in Table 2.

Table 1—Liquid Volume Per Cent Yields From Northern Hemisphere Crude Oils Currently Being Processed (Gravity, Approximately 34° A.P.I.)

	Thermal cracking per cent	Catalytic cracking per cent
Total gasoline	50.6	52.9
Kero. or S.R. distillate	18.0	18.0
Lt. catalytic distillate		5.8
Light products	68.6	75.7
Residual fuel oil	28.7	20.6
Liquid recovery	97.3	96.3

Table 2—Liquid Volume Per Cent Yields From 24° A.P.I. Crude Oils That May Be Processed in the Future

	Thermal cracking per cent	Catalytic cracking per cent
Total gasoline	45.7	48.8
Kero. or S.R. distillate	10.0	10.0
Lt. catalytic distillate		7.0
Light products	55.8	65.8
Residual fuel oil	42.7	31.4
Liquid recovery	98.5	97.2

Tables 1 and 2 indicate that additional over-supplies of residual fuel oil will arise with each barrel of 24° A.P.I. crude oil that is processed in the amount of 0.11 to 0.14 bbl. of fuel oil for each barrel of 24° A.P.I. crude oil processed. This, however, reflects only the effect of crude-oil gravity on the yield of fuel oil; it fails to take into account the fact that lesser amounts of light products are produced from the low-gravity crude oils. From 8 to 23 (average of 15) per cent extra 24° A.P.I. crude oil must be processed in order to produce the same amount of light products. Thus, the over-all result indicates an additional 0.16 to 0.24 bbl. of residual fuel oil for each barrel of 24° A.P.I. crude oil processed. The 0.16 to 0.24 bbl. is excess over and above the already oversupplied market. If in the future we find that we must regularly process a million barrels of 24° A.P.I. crude oil, we will have available 160,000 to 240,000 bbl. per day of residual fuel oil for hydrogenation or other means of disposing of fuel oil.

Finally, none of the above attempts to account for increasing demands, or changes in the relative demands for the various products. In general, it seems that the demand for residual fuel oils will in the future decrease rather than increase.

Sweetland Filter Press Sizes

In a recent article on Filter Press Costs it was stated that Sweetland presses are of standard sizes. Can you indicate the standard sizes for us?—P. M. C.

Various manufacturers may offer different standard sizes of Sweetland filters but it is thought that the sizes of Table 1 of Oliver United Filters, Inc., are substantially standard for all manufacturers.

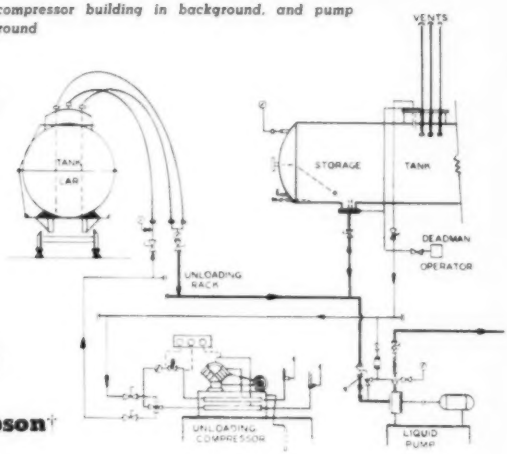
TABLE 1—CAPACITIES AND SIZES OF SWEETLAND FILTER PRESSES, OLIVER UNITED FILTERS, INC.

Filter numbers	1	2A	2	3	5	7	10	12
Inside diameter, in.	10	16	16	25	25	25	31	37
Inside length, in.	20½	19	36½	37	61	82	109	145
2-in. filter spacing:								
Number of leaves	9	9	18	18	30	41	54	72
Filter area, sq. ft.:								
Smooth rim	8	23	46	111	185	252	523	1,004
Grooved rim	7.5	21	42	105	175	239	500	965
Max. cake capacity, cu. ft., with ½-in. cake	0.3	1	2	4.8	8	11	22	42
3-in. filter spacing:								
Number of leaves	7	....	12	12	20	27	36	48
Filter area, sq. ft.:								
Smooth rim	6	....	31	74	123	166	349	670
Grooved rim	5.7	....	28	70	117	158	333	642
Max. cake capacity, cu. ft., with 1-in. cake	0.5	....	2.3	6.4	10	14	28	56
4-in. filter spacing:								
Number of leaves	5	....	9	9	15	20	27	36
Filter area, sq. ft.:								
Smooth rim	4.5	....	23	55	92	123	262	502
Grooved rim	4	....	21	53	88	117	250	483
Max. cake capacity, cu. ft., with 1½-in. cake	0.6	....	3	7.2	12	15	33	63
Total weight of filter filled with water, lb.	550	1,500	2,300	5,500	7,300	9,350	16,500	29,600
Shipping weight, lb.:								
Domestic	500	1,300	2,100	4,800	6,200	7,900	13,500	24,000
Export	600	1,400	2,200	5,400	7,600	9,300	16,500	29,000

Mixing station for propane-air gas mixtures. Mixing tower shown at left, compressor building in background, and pump house and storage tank in foreground

Underground Storage of Propane-Air and Natural-Gas Mixtures

by H. L. Fruechtenicht* and John B. Simpson†



This is the story of a unique new plant in Michigan which stores propane, natural gas, and air in a previously depleted gas field. In one period of 3½ months operation, 1,194 tank cars of propane (11,570,900 gal.) were stored via 293 wells. Injection and storage pressures range from 400 to 525 psig.

IN order to meet high peak demands during the winter heating season, Michigan Gas Storage Co. has adopted the plan of underground storing of propane, natural gas, and air during the summer months. The gas mixtures are injected during the months of April to November, and the stored gas is used from December through March. Demands for the gas vary widely, from 20,000,000 cu. ft. per day in the summer to 100,000,000 cu. ft. per day in the winter. Michigan Gas Storage is a subsidiary of Consumers Power Co. and Panhandle Eastern Pipe Line Co.

Early in 1948 it was estimated that 12 billion cubic feet of gas had to be stored during the input cycle of 1948, to meet requirements during the 1948-49 winter season and to replace the cushion gas which had been withdrawn during the winter of 1947-48. Careful studies of the conditions in the storage fields showed that the fields could not be depleted below 375 psig. without inviting damage to the reservoir. However, in order that service would not be curtailed and industry shut down during the winter of 1947-48 as it had been in other areas throughout the country, the company elected to continue full service even though the pressure fell below 375 psig. As a result, the cushion was depleted to 334 psig.

During the winter of 1947-48 when great demands were made upon the storage fields to avoid any curtailment of market, an increased amount of water was recorded in the wells of the storage fields. This water encroachment became greater as the pressure fell below 375 psig. While some damage may have been done to the storage fields when they were operating from 375 down to 334 psig., the time the fields were operating at this lower pressure was of short duration. Any damage done is not believed to be permanent.

To meet an anticipated deficit in gas supply for 1948, engineers of Michigan Gas Storage Co. and Consumers Power Co., a customer of the storage company, studied various methods of obtaining additional gas. Sources of natural gas in Michigan were limited and no new discoveries had been made for several years. High-B.t.u. oil gas made in several existing emergency standby plants was considered, but shortage of oil and operating difficulties forestalled this plan. Installation of peak-shaving propane-air units at principal distribution points was also contemplated, but the cost, amounting to several million dollars, was prohibitive and material shortages in this type of equipment were acute.

There finally emerged from these studies a plan to build one propane-air plant at the storage field, having a capacity of 10,000,000 cu. ft. per day of propane air, and mix propane-air gas with large amounts of natural gas and store the mixture underground. The plant could be built for approximately $250,000 because part of the necessary equipment (compressors, boilers and mixing tower), was installed and available for quick conversion. This plan offered continuous operation of the propane-air plant and a uniform mixture immediately available for use when needed.

As far as could be determined, mixing propane-air and natural gas for

*General superintendent, and †Engineer, Michigan Gas Storage Co., Jackson, Mich.

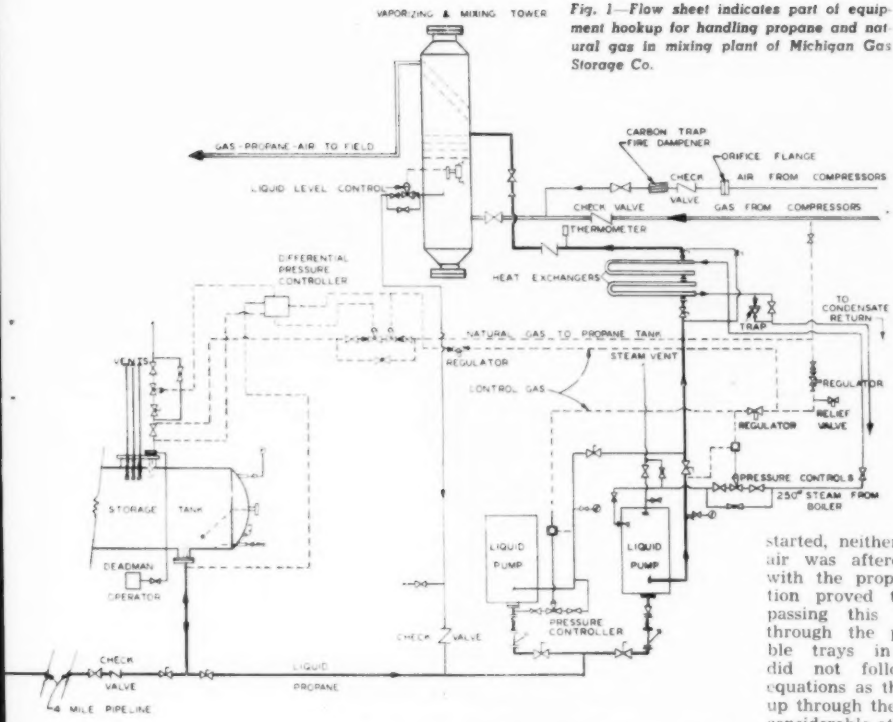


Fig. 1—Flow sheet indicates part of equipment hookup for handling propane and natural gas in mixing plant of Michigan Gas Storage Co.

underground storage on such a large scale had never been attempted before, and some questions were raised as to recovery, vaporization, condensation, interchangeability, and hydrate trouble to be encountered. Each of these factors was investigated, and the theoretical conclusions showed the plan to be workable.

Equipment and Operation

Approval for construction was given June 3, 1948, and procurement of material and construction of the facilities started immediately. Construction included building a 1,600-ft. railroad spur, six unloading racks, and two steel buildings, and installing three vapor compressors, two liquid-transfer pumps, and one 30,000-gal. storage tank at the proposed unloading station. A 4-mile 4-in. pipe line, together with a 4,800-volt, three-phase power line and a private telephone line, was built to connect the unloading station with the mixing station.

The mixing station was incorporated with the natural-gas compressor station injecting gas into the storage wells. A 30,000-gal. storage tank, two high-pressure liquid-transfer pumps, a steam-heated vaporizer, and one 800-hp. two-stage air compressor were installed. One 800-hp. single-stage gas compressor was converted to a third-stage air compressor. One of the gas-compressor-station dehydration contact towers was changed to a propane-air-gas mixing tower, and the necessary steam and water connections were made. Air lines, aftercoolers, intercoolers, a carbon and fire arrester, and other auxiliary equipment were installed to complete the mixing plant. For a diagrammatic plan of this system, see Fig. 1.

After the plant was completed and had settled into normal operation, six tank cars of propane were unloaded at a time and the liquid pumped to the mixing station through the pipe line. The end tanks acted as surge tanks and reservoirs to allow flexibility in the unloading operation. Propane in storage tanks was used as a supply while the vapor was being removed from the tank cars and while tank cars were being switched to the siding or shuttled along the siding to unloading points. At the mixing station the propane was then pumped to a steam heat exchanger for vaporization and then to the mixing tower.

During summer operation, the propane was bypassed around the vaporizer as the heat of compression of the air and the natural gas furnished the heat for vaporization of the propane. To vaporize 100,000 to 140,000 gal. of propane per day from 70° to 193° F. at 540 psia. requires from 75,000,000 to 106,000,000 B.t.u. per day.

Natural gas in being compressed from an average suction pressure of 200 psig. to a discharge pressure of 525 psig. gave an actual discharge temperature of approximately 170° F. without aftercooling. The specific heat of gas accounts for 24 B.t.u./M.c.f./° F. temperature change, and thus 40 to 60 million feet of gas is being cooled from 170° to the injection temperature of 70° F. gave 95,000,000 to 144,000,000 B.t.u. per day available from gas compression. The third-stage air, in being compressed from 90 to 475 psig., had an actual discharge temperature of approximately 375° F. and about 35,000,000 B.t.u. per day were available from air compression.

When operations started, neither the natural gas nor air was aftercooled before mixing with the propane. However, operation proved that vaporization, by passing this hot gas-air mixture through the propane or the bubble trays in the mixing tower, did not follow the heat-balance equations as the gas and air passing up through the liquid propane had a considerable atomizing or mist action. It was found that an inlet temperature of air and natural gas of 90° F., regulated by the amount of aftercooling, was all that was required to give the 70° F. temperature desired for injection into the wells.

The third-stage air was discharged at the same pressure as the discharge pressure of the natural gas going into the storage fields. The air merged with the natural gas just before it entered the mixing tower. Then the mixture of natural gas and air was bubbled up through the liquid propane. The resultant mixture of propane-air-natural gas leaving the mixing tower entered the field gathering system and passed down through the wells into a sand reservoir approximately ¼ mile below the earth's surface.

Properties of Gas Mixture

The general properties of the mixture were as follows: from 100,000 to 140,000 gal. of propane were mixed with 40 to 60 million cubic feet per day of dry natural gas of 0.685 gravity and 1,000 B.t.u. and then enough air was added to bring the mixture back to approximately the same B.t.u. content; namely, 1,000 B.t.u. At the higher rates of propane use, 140,000 gal. or more, the 1,000-B.t.u. standard could not be maintained, as the air compressor capacity was limited to 6,000,000 cu. ft. per day. The pressure on the mixture varied from 400 to

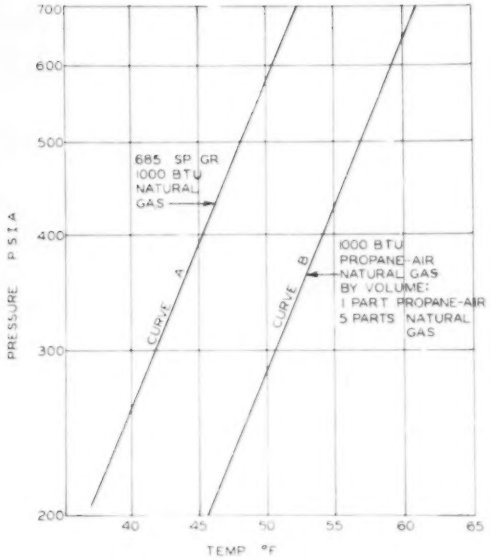


Fig. 2—Hydrate equilibrium curves

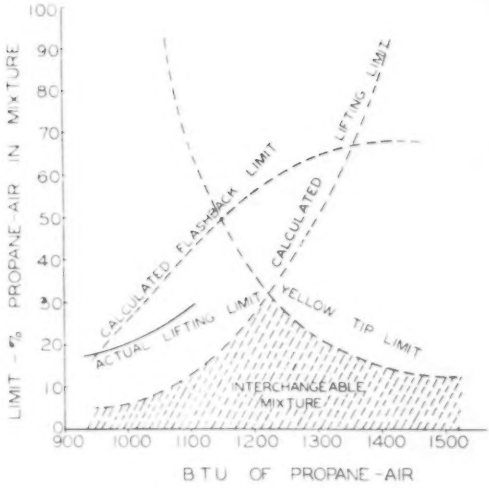


Fig. 3—Showing allowable limits for propane-air-natural gas mixture. Natural gas (0.685 specific gravity and 1,000 B.t.u.) has volume composition of: CO_2, 0.1 per cent; O_2, 0.2 per cent; CH_4, 74.7 per cent; C_2H_6, 13.7 per cent, and N_2, 11.3 per cent

525 psig. in being compressed and stored in the field.

The bottom-hole or reservoir temperature was 60 F. The vapor pressure of the propane at this temperature was approximately 92 psig. The propane-air varied from approximately 15 to 25 per cent of the total mixture and the propane varied from 6 to 11 per cent. Partial pressures due to the propane varied from 31 to 58 psig. and the propane therefore never condensed either in the field lines or in the wells, and no liquid propane has been found in the wells or gathering system drips to date. The averages of spot-check analyses of the natural gas and of the mixture to and from the storage fields are shown in Table 1.

TABLE 1—AVERAGE OF SPOT CHECK ANALYSES

	Natural gas (%)	Mixture to field (%)	Mixture from field (%)
Nitrogen and noncondensables	11.3	15.3	13.6
Oxygen	0.2	2.3	Trace
Methane	74.7	65.5	72.0
Ethane	13.7	5.8	6.6
Propane	0	10.9	7.0
Butane	0	0.1	0.6
Carbon dioxide	0.1	0.1	0.2
Total	100.0	100.0	100.0

A hydrate equilibrium curve as experienced for the straight natural gas and also for the normal propane-air-natural gas mixture is shown as Fig. 2. For straight natural gas at 540 psia. the hydrate equilibrium point is shown on the curve A as approximately 49 F.; in normal operation little trouble is encountered except at the well head or well-head drip where there are restrictions with their subsequent cooling effect. An insulated well-head house and indirect heater counteracts this cooling effect by maintaining a uniform temperature.

The hydrate equilibrium point for the normal propane-air-natural gas mixture at 540 psia. as shown on curve B is approximately 56 F. Some hydrate trouble was expected with the storing of the mixture and consequently the well-head temperature was maintained at or above 70 F.

Used 293 Storage Wells

Out of a total of 293 storage wells some hydrate trouble was experienced in 37 wells. Temperature surveys in the wells revealed that a temperature of 49 F. was present at a depth between 600 and 700 ft. and then rose gradually until it reached 60 to 62 F. at approximately 1,335 ft. In these 37 wells hydrate bridges formed anywhere between 150 and 700 ft. below the surface in the well bore and effectively blocked the flow of gas. Neither the use of alcohol bottles nor the shutting in of the well removed the bridge and the only effective method found was to open the well to atmosphere and let it blow the hydrate bridge out.

The hydrate bridges occurred more frequently when an insufficient amount of air was added to the mixture to maintain the 1,000-B.t.u. heating value. By some experimentation and review of previous operating data, an upper limit of 1,030 B.t.u. was set as the maximum allowable point and little hydrate trouble was experienced thereafter. The only control on the B.t.u. range was the amount of air added to the mixture and it was limited to 6 million cubic feet per day. Some shipping delays necessitated a greater input of propane than was originally planned and it was at these high input periods that trouble was experienced.

Operational Difficulties

At times as many as 18 cars a day were unloaded instead of the 12 cars originally planned and the time spent in removing the vapor from the cars became a limiting factor. During the hot weather the propane vapor being pumped from the tank cars would not reliquefy fast enough and the tank pressure would rise above 200 psig., thus causing the relief valve to open. It was not possible nor feasible to install a refrigerating unit so a water spray was attached to the tank using the relatively cold ground water and this helped to reliquefy the propane to a marked degree. This speed of unloading and vapor trouble necessitated leaving many cars with 40 to 50 psig. of propane vapor to go back to the shipper and increased the losses above those normally expected.

When the gathering system was installed in the field, it was not cleaned by the use of a "pig" but was only purged and blown. The high rates of reverse flow and the oxygen content of the propane-air-gas mixture caused old scale to flake off and some new iron oxide to form. It would then fall off and was carried to the wells and in some instances had to be removed by blowing the wells.

With a compression ratio of 5.2 at times in the third-stage air compressor temperatures actually reached

(Continued on page 76)

Problems and Methods of Contract Drilling

While it may be that a perfect drilling contract will never be developed, this article considers the problems of contract drilling and outlines several types of contracts in use. The article also discusses the form of the contract, types of rates generally considered, and the many contingency problems that require additional clarification. Proper attention to these items will make it easier to apply common sense and fairness to the benefit of both the contractor and the company.

The author is with Union Oil Co. of California, and his paper published here was presented at the Los Angeles A.P.I. meeting of May 12-13.

by Henry E. Winter

THE increasing trend in California toward rotary drilling by contractors has brought to light a number of things which could be more clearly covered in a contract in order to save later misunderstandings. The following ideas are intended to refer only to California methods and practices.

About 10 years ago an A.P.I. committee tried to formulate a uniform drilling contract for California but such a contract never was developed, although many ideas were brought out which are in use at the present time. It is doubtful whether the perfect drilling contract will be developed, as the oil business itself keeps changing or progressing, and methods of contracting have to change with it. In the last analysis, a contract is simply a written agreement of a meeting of the minds wherein one party agrees to perform certain work or operations for a consideration to be paid by the other party.

The word "contractor" will be used hereafter to refer to the drilling contractor and "company" will be used to mean the oil company or operator hiring the contractor.

Types of Contracts

There are several types of contracts in use at present, each of which has advantages and disadvantages. These are as follows:

1. **"Footage or bottom hole."**—The advantage of the footage type of contract is simplicity as far as the company is concerned. The contractor's price usually includes moving in and out with derrick, hoist, pumps, drill pipe, racks, etc., and he can drill the hole with his own preference as to type of bits and wear on machinery.

This type of contract is used to best advantage when the subsurface formations are known and the contractor can obtain good data on time and bits from nearby wells from which to estimate costs.

2. **"Day work."**—This type of contract is more or less necessary for wildcat or exploratory wells and for redrill or workover jobs.

While a contractor can give a footage bid for this type of work, the number of unknowns which he faces is bound to make him add plenty of "insurace," in which case the company will pay too great a price for the work if the insurance should not be needed.

3. **"Modified day work."**—This is a form of contract in which the contractor bids a cost per day plus so much a foot for each foot of hole drilled.

It has some advantages, especially in proven fields, in that if the contractor should have some hard luck, he is not liable to lose much money on the job and is more or less sure of some profit if he stays there long enough to make the hole.

The disadvantages are that about the time the formations soften up and the contractor can make some footage to add to his daily rate, the engineer or geologist on the job decides to core or make formation tests.

By the time an area is developed to the point that the proper rate per foot can be established, there is usually enough information available to get reasonable competitive footage bids.

4. **"Cost plus percentage profit."**—This type of contract is usually in use only when one contractor is doing all the work for some company and it involves a well-established cost-accounting method on the part of the contractor, plus periodic checking of costs and readjustment, in order to insure a fair cost to the company and a fair profit to the contractor. From a practical standpoint this method is easy for a company to operate under but it usually involves an obligation to keep the contractor busy and a contractor can get lax and out of date without competition.

5. **"Day work incentive."**—Some attempts have been made with a form of contract in which the contractor works at his regular day rate for so many days and beyond this number of days at a lesser or cost rate. If the contractor finishes the work in less than the specified number of days, he gets as a bonus one-half or some other percentage of the saving which he makes the company. This idea involves the agreeing upon a number of days and the company furnishing bits and mud.

By making a flat rate for moving in and out and rigging up and dismantling, this method of contracting could insure the contractor against loss and he would tend to keep the drilling cost low. A flat sum for taking the risk of fishing to some specified depth would eliminate the company's risk of having the contractor show up with a poor string of drill pipe. While every contractor admits

that he has only the best in drill pipe, the company representatives oftentimes have occasion to question this.

Request for Bids

If a company is choosing its contractors by competitive bid, one of the most important things is a clear, concise letter requesting bids. This permits the contractor to make fair competitive bids, which can easily be compared by the company.

The request should contain the location of the well and a fairly detailed description of the work, especially size and amount of casing, hole sizes, coring expected, type of mud to be used and how much company will furnish, how much standing-cemented time and loss-of-circulation time contractor is expected to furnish. Under some circumstances it may be desirable to request the contractor to bid with a specified size, or larger, equipment. Conditions may make it desirable to use a standard steel derrick instead of a mast and two or more pumps. These are the items which largely affect the contractor's footage price.

Other items which could be included are the names of company representatives who should be contacted in order to obtain site and cellar specifications, together with bit and subsurface data from surrounding wells.

The request for bid should tabulate who is to furnish the major items such as blowout equipment, fuel, water, mud and water storage, bits and core heads, cementing or logging services, or other items which are not usually a part of the contractor's equipment.

The bid request should clearly state the time limits when bids should be in and the interval or time limit within which contractor should be starting to drill. The greater interval that can be given for a contractor to move in will oftentimes lower the cost per foot considerably as a contractor has a problem in keeping his rigs busy without delays between jobs, and a short move by some contractor in the area will cost him and ultimately the company less per foot than a long move by any contractor. When it is necessary for the company to make a hurry-up deal to meet some deadline, this always costs the company considerably more as it limits the number of contractors available to furnish competitive bids.

Bid requests should ask for the various rates in the same form as they will be in the contract; namely, footage rate, coring rates, hourly rate with drill pipe, hourly rate without drill pipe, delay time, shutdown time, rates for use of different type of circulating fluids, and any other rates that may be desired. If these are all answered by the contractor, it should not take the company long to make a comparison and decide on the contractor.

As a matter of good business practice, the losing bidders should be notified as soon as possible in order that they can be looking for another job.

In making a request for bid, it will pay the company to take as much risk as possible off the contractor especially as to unforeseen or unusual items. Whenever the contractor takes risk, he has to put in insurance for it and most of these risks can be better taken by the company. The items of number of days to drill the hole and number of bits to be used in a footage-type contract are, of course, matters of judgment and the contractor's confidence in his ability. Items such as amount of mud to be used and loss of circulation had, in general, better be taken by the company. They present a problem on only a few jobs and it saves paying for them on every job, even if some contractor will take the risk. The contractor that takes these risks continually without plenty of cushion in his price or a limit on his risk is likely not to be contracting very long.

Form of Contract

Contracts usually take one of three forms; namely, simple letters of agreement without much detail, legal documents with detailed check lists attached, or the legal document with an exhibit attached which gives the procedure, various rates of compensation, and the general items to be furnished by contractor and company.

The simple letter of agreement is good only when the same parties are working with each other and have arrived at a lot of general verbal understandings. Auditing and purchasing departments are not much interested in this form of contract.

The contract with the detailed check list is a good answer when all the wells are drilled in one area, but it is hard to make a check list that takes care of all contingencies in all areas. By the time the list is complete enough to take care of all contingencies that keep showing up in the oil business, the list is so long and detailed that one cannot find what he wants in it.

This check list requires a lot of work and more details than the engineer is likely to furnish in order to do it right. It does not give the company representative much room to use good judgment and fair dealing in taking care of the unexpected.

The legal document with an exhibit attached which gives the procedure, compensation for various contingencies, and general items to be furnished seems to work fairly well. It should cover the major items to be furnished by each party, and the matter of determining which rate is to be used can always be answered by asking the question—"For whose benefit is this particular part of the job?" Either the contractor has to do it as part of his contract or the company wants it done as an extra.

Common sense and fairness with a little give and take will always solve these minor differences. The time and work that would be spent in trying to get every contract "foolproof" had better be spent in developing better supervising personnel.

Types of Rates

It is desirable that a contract should have rates for all the possible contingencies that might occur in drilling the well. The following types of rates, while not complete, seem to cover the matter:

Footage Contract

1. (a) Rate per foot, including derrick, moving in and out, rigging up and dismantling, running casing and liner. (b) Rate per foot, or daily rate, for coring. Whether coring should be on footage or day rate depends upon the amount of coring and how definite the coring program is. (c) Daily rate for unanticipated directional drilling or exploratory drilling below estimated depth.

2. Hourly rate for miscellaneous work using drill pipe.

3. Hourly rate for miscellaneous work using machinery and crew but **not** drill pipe.

4. Hourly rate for delay time with full crew available.

5. Hourly rate for shutdown time (equipment and watchman).

6. Daily rate for use of oil base drilling fluids.

7. Daily rate for use of oil emulsion drilling fluids.

8. Daily rate for use of starch base drilling fluids.

Day Work

1. Flat rate to move derrick and machinery in and out, rig up and dismantle. This can be broken down to cover the various items such as derrick (or mast), erection, rental of derrick, moving in and out, rigging up and dismantling.

2. Daily rate for drilling, coring, and work with drill pipe.

3. Daily rate for work using machinery and crew but **not** drill pipe.

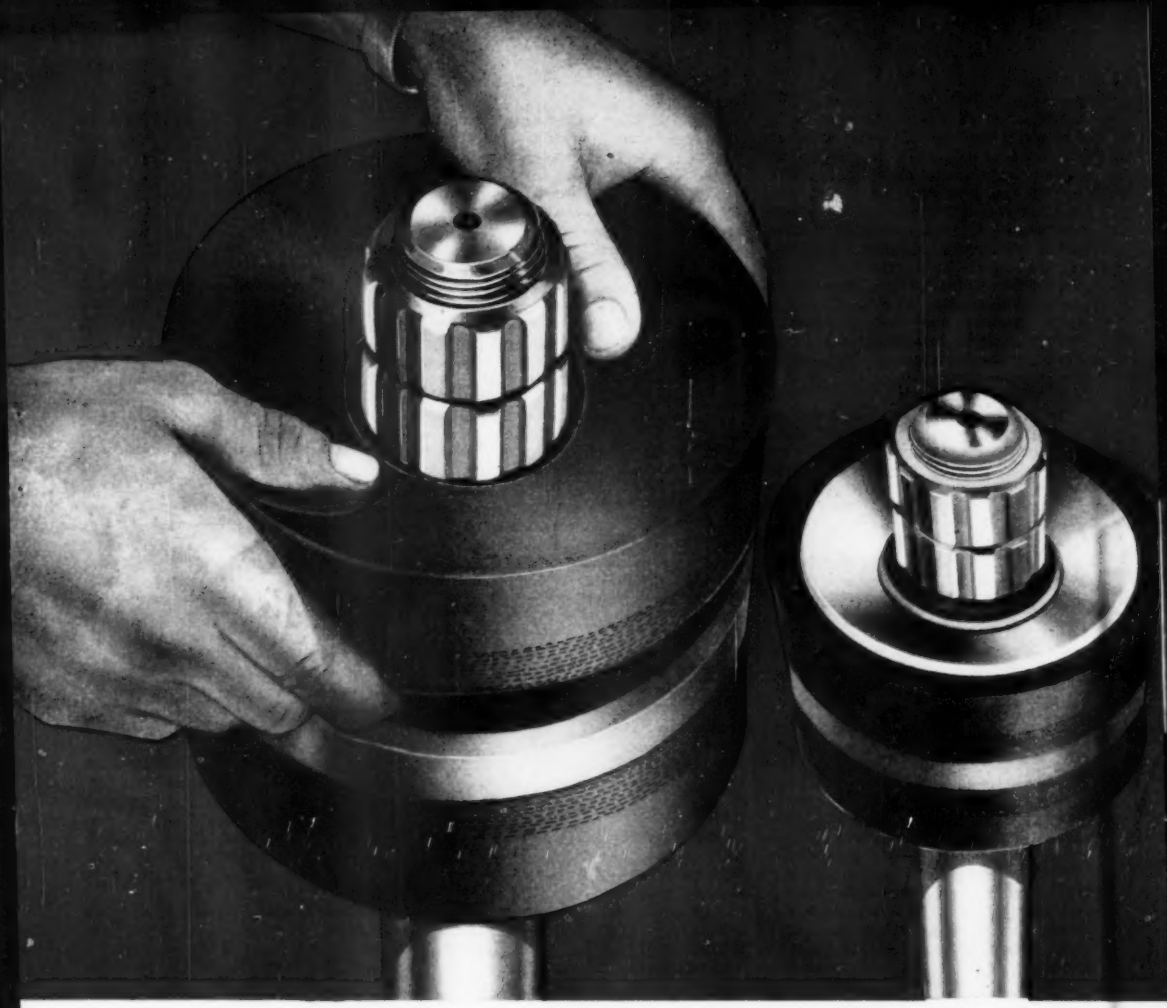
4 to 8. Same as under footage contract.

Equipment, Materials, and Services

The question of "who furnishes what" will vary considerably both with the type of contract and general custom in the local area.

The company usually furnishes roads, site, water, casing, tubing, casing-landing equipment, cementing and logging services, formation and water shutoff testers. The general viewpoint is for the company to pay for those things which are not a part of the contractor's equipment.

The contractor usually furnishes all the necessary tools and equipment to do the work, such as the derrick (or mast), hoists, circulating pumps, drill pipe and drill collars, casing and sand lines, casing racks and lighting equipment.



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Some of the items which could be furnished by either and, as such, should be specifically mentioned, are cellar, conductor pipe and risers, sumps, fuel and fuel storage, blowout equipment, bits, core heads, hole openers, reamers, mud and mud storage, extra water storage, casing and tubing tools.

Depending upon local custom or verbal agreements, to adjust a bill is more trouble and less satisfactory than simply to enumerate the major items in a contract.

Problems Needing Clarification

There are several items which come up periodically and are often omitted from contracts or upon which there is a wide diversity of opinion or custom of settlement. Some of these items are oftentimes not anticipated at the time the contract is made; but even when they are foreseen, a good method of evaluating them does not yet seem to have been developed.

1. **Loss of tools.**—In a footage contract this is a risk that the contractor is presumed to take as the tools are his as well as the responsibility while fishing for the tools. However, there is often a difference of opinion when the tools are lost due to loss of circulation which was not anticipated. The question then arises as to whether the tools were lost due to the contractor carrying the mud too heavy and thereby causing the loss of circulation, or due to contractor's operational procedure or negligence after the loss of circulation started.

In the day-work type of contract, this problem does not usually arise as the customary viewpoint is that the contractor is doing what the company requests and the company is assuming the loss of tools and reserving the right to decide upon the fishing procedure.

2. **Breakdowns of contractor's equipment.**—In footage-type contracts, this is a factor only while the contractor is doing day work and is usually more or less negligible, although the average contractor should have about an hour a day in his price for it.

In day-work contracts it is a factor for the whole job and the company should set some limit per breakdown or per month. The reputable contractor doesn't expect to repair all his machinery on the job, but the unexpected always happens and a time limit on this item is a good method of making the contractor guarantee that his machinery is in good working condition. The limit should be reasonable as a contractor is going to have these minor breakdowns and too much intolerance along this line tends to force dishonesty on the part of the contractor's crew when keeping a log book of their time.

3. **Loss of circulation.**—Some areas do not have to contend with this problem, but where loss of circulation is likely to be encountered, the amount of time which the contractor should furnish should be clearly stated. Some of the other problems that go with loss of circulation are the possibility of losing drill pipe due to loss of circulation and the question of which party is in charge of the mud control in trying to regain circulation. Other problems which often arise are whether the contractor was negligent in keeping his mud weight too high and thus contributed to loss of circulation; or was his operational procedure, as soon as the loss was noticed, the proper one? Should he have stayed in the hole and tried to regain circulation or should he have pulled out of the hole at once?

4. **Excessive wear of drill pipe.**—In areas where the formations are known, this item is usually considered in the contractor's bid price, but on wildcat or directional wells on day work, contractors either have to put in an estimate for this contingency or the contract should make some provision for reimbursing for wear above normal if it should occur. One method is for the company to agree to pay one-half the cost of building up tool joints or drill collars for such abnormal wear on the theory that, if the contractor believes it necessary to spend his own money on such repairs, the company will match this amount. This would presume that the contractor will show up on the job with a good string of drill pipe and not one which needs repairing soon after it shows up on the job.

Some of the above reasoning can also be used on day-work wells for straightening drill pipe bent due to fishing, directional hole, or formation testing.

In the Rocky Mountain area a custom is in use of bidding a separate price for drill pipe which depends upon depths at 1,000-ft. intervals and days in use. This method might have some possibilities in California, especially along the line of unanticipated excessive wear.

5. **Insurance.**—Insurance of some kind is required by the company in all contracts. The three types commonly required are: workmen's compensation, public liability, and property damage. The contractor complains that insurance costs a lot of money and the company oftentimes wonders what it gets for it. In practically all wells drilled, there are times when the contractor is working under day work and the contractor's viewpoint is that part of his liability ceases when working under the orders of the company.

While the company under the various "hold harmless" clauses in all contracts tries to saddle the liability on the contractor, it probably develops in practice that they are both paying for insurance for the same thing, as the company cannot fully rid itself of primary liability except where negligence of contractor is proven. Trying to prove negligence on the part of the contractor is usually very difficult. Probably the only reason that many contractors are still in business or that companies can get wells drilled is because of a certain amount of forbearance on the part of companies enforcing the hold harmless clause.

6. **Bonds and credit rating.**—Some companies require bonds by the contractor for faithful performance but in the last analysis, the company has to pay for the bond. This is an extra cost to the company that is probably not necessary except in unusual circumstances. In general, part of the same results can be obtained by watching the contractor's credit rating and filing a notice of completion.

7. **Special tools and services.**—Customarily the company furnishes many of the special tools or services required in drilling a well, such as cementing, logging, formation, water shutoff testing, and blowout equipment. These items should all be mentioned in the contract in order to avoid any misunderstanding as to who is to furnish them.

In some sections of the United States, blowout equipment is part of the contractor's tools and he should furnish it as part of his equipment. The general California viewpoint seems to be that the company has better control of this item if it furnishes it, especially in view of the fact that few contractors have blowout equipment and the contractor would simply go rent it and put it in the contractor's price.

8. **Miscellaneous items.**—There are a number of other items which are more properly part of the contractor's service; for example, safety practices, neatness of rig area, excessive use of water, to mention only a few of them. In the final analysis a contractor furnishes a service and these things are a part of that service, as well as his derrick, hoist, pump, and drill pipe.

Underground Storage

(Continued from page 72)

375° F. or more. Excess oil in the compression cylinders formed particles of red-hot carbon on the valves and deposited some oil in the air line. The carbon particles broke off and ignited the oil causing fire inside the air pipe line and raised the temperature of the air going to the mixing tower in excess of 450° F. Careful regulation of lubricating oil did not entirely remove this hazard so an aftercooler was installed and the air cooled to 100° F.

A fire dampener and carbon arrester was originally installed just ahead of the air-gas mixing point to keep any fire from the gas and propane. The total oxygen content of the mixture was 5 per cent as a maximum and 17.7 per cent was re-

quired to support combustion so no fire in the mixture was possible. The aftercooler installed at this time, together with the intercoolers originally installed, removed a considerable amount of water from the air and helped to reduce the quantity of water in the mixture stored in the field. It also offered another means of temperature control.

To keep the high-pressure liquid-propane positive-displacement pumps from vapor locking in the suction valve ports it was necessary to increase the suction head. A natural-gas pressure of 10 to 40 psig. in excess of the vapor pressure of propane was imposed upon the mixing-station storage tank by means of a differential pressure controller.

Interchangeability of the propane-air-natural gas mixture with straight natural gas was calculated to be allowable at 7 per cent of 1,000-B.t.u. propane-air in the mixture as shown in Fig. 3. However, experimental testing indicated a higher allowable per cent mixture and it was believed that little trouble would be experienced with as much as 18 per cent propane-air in actual practice. It developed that approximately 21 per cent of the mixture was propane-air before trouble in utilization developed as experienced by trouble calls from customers.

Mixing Proportions

From July 15 to November 1, 1948, a total of 1,194 cars containing 11,570,900 gal. of propane was handled. Losses due to various causes amounted to 427,520 gal., therefore 11,143,380 gal. of propane was vaporized and mixed with 556,358,000 cu. ft. of air to make 960,000,000 cu. ft. of propane-air gas with an average B.t.u. of 1,060. This was mixed with 10,660,000,000 cu. ft. of natural gas to give the resultant propane-air-natural gas mixture a B.t.u. value of approximately 1,007 and a specific gravity ranging from 0.720 to 0.790.

From December 13, 1948, to March 13, 1949, a total of 273 cars containing 2,783,920 gal. of propane was handled. Losses due to various causes amounted to 16,275 gal., therefore 2,767,645 gal. of propane was vaporized and mixed with 210,822,000 cu. ft. of air to make 310,990,000 cu. ft. of propane-air gas with an average B.t.u. of 812. This was mixed with the propane-air-natural gas mixture coming from the storage fields, and the resultant mixture transmitted to markets averaged 1,000 B.t.u. These two operations meant that most of the natural gas received during the summer for storage was enriched twice with propane.

During this second period the propane-air percentage of the mixture transmitted to market at times rose as high as 22 per cent at 1,000 B.t.u. At this percentage some trouble was experienced with reducing atmosphere process furnaces, raw-gas pilots, and a few home refrigerator burners; however, the number of service calls was not great in number and there were very few repeat calls.

During the winter some modification in the plant layout was necessary for good operation during the cold weather. The mixing tower was changed back to a dehydration contact tower to prevent hydrate trouble in the transmission system. The propane was vaporized entirely by the steam heat exchanger and discharged into the suction of the gas compressors. No change was made in the air piping. During this type of operation the vaporization followed heat balance equations perfectly, and it was necessary to temporarily install an oil field boiler to supply necessary steam to the heat exchanger.

Costs and Testing

Total cost of the propane plant except for that material and equipment on hand and available for conversion and use was $252,000. The cost of the 14,354,820 gal. of propane including freight to unloading station was $1,576,100. The operating labor, material and supplies, and fixed charges amounted to $266,900. The total cost of the approximately 1,271,000,000 cu. ft. of propane-air gas was $1,843,000 or an average cost of $1.45 per thousand cubic feet.

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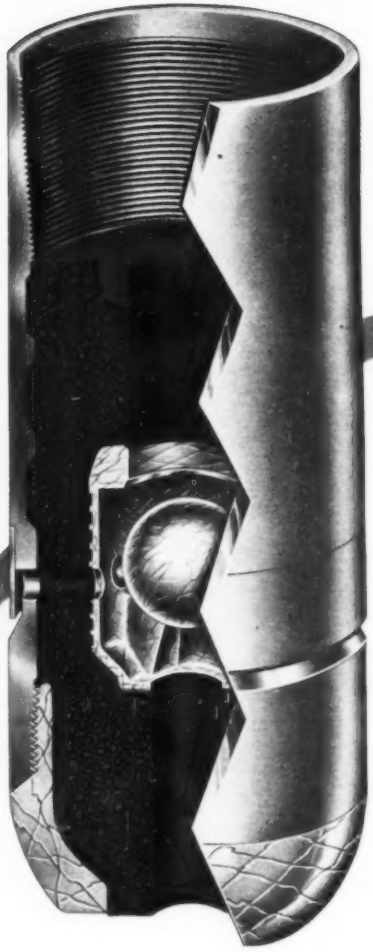

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ENGINEERING fundamentals

The Jamin Effect

IN a previous Engineering Fundamentals (No. 327) the idea of a pressure existing across an interface within a capillary system was discussed. When more than one interface is present in a given channel, conditions may be such that the resistance to flow is markedly increased or may become great enough to prohibit flow. This effect is named after its discoverer, Jamin.

Consider at first a straight bore cylindrical capillary. The capillary pressure, which is equivalent to the displacement pressure, is given by (Engineering Fundamentals No. 327):

$$P_D = \frac{2\gamma \cos\theta}{R} \qquad (1)$$

This is the pressure difference between points A and B in Fig. 1-A. It is also the pressure necessary to keep the interface from moving to the right at point B within the capillary, or, under static conditions:

$$P_B - P_A = \frac{2\gamma \cos\theta}{R}$$

Now consider a discrete globule of one fluid within another fluid with which it is immiscible, as in Fig. 1-B. There are now two interfaces, the pressure drop across each interface is the same but opposite in direction to the other, and there is no net pressure necessary to prevent motion. The total pressure drop between the points A and B is zero, as seen by:

$$P_B - P_A = \left(\frac{2\gamma \cos\theta}{R}\right)_A - \left(\frac{2\gamma \cos\theta}{R}\right)_B = 0 \qquad (2)$$

Now, if either term of Equation 2 were modified, the net pressure drop between points A and B would not be zero. This condition gives the Jamin effect, i.e., a resistance to flow. The difference may not be zero due to a change in any one of the three terms, γ, $\cos\theta$, or R.

Consider first a variation in R as in Fig. 2-A. The capillary is no longer considered to have a uniform radius. The difference in pressure between points A and B is now:

$$P_B - P_A = 2\gamma \cos\theta\,(1/R_A - 1/R_B) \qquad (3)$$

Inasmuch as R_B is less than R_A a positive pressure is required at point A to retain the bubble in the position shown. If flow were to the right, a bubble of oil in the water stream could block such a channel until the pressure drop between points A and B was sufficiently great to push the bubble past the smallest constriction at the point where the channel again widened.

Consider a variation in the angle θ as shown in Fig. 2-B. The situation occurs in many instances due to the existence of different advancing and receding contact angles. The angle θ at A is defined as an advancing contact angle and that at B as a receding contact angle. The former is always larger than the latter. Such a deformation of a bubble takes place when it is on the verge of movement, as toward the right in the figure shown. The resultant pressure between points A and B is:

$$P_B - P_A = \frac{2\gamma}{R}(\cos\theta_A - \cos\theta_B) \qquad (4)$$

Inasmuch as θ_A is larger than θ_B, P_A will be larger than P_B. A pressure drop between A and B is necessary to initiate flow. A total of n such bubbles within a tube would require a pressure drop of $n(P_B - P_A)$ to move them.

A third situation giving the Jamin effect occurs when the interfacial tension is variable. For example, as shown in Fig. 2-C, if the bubble of gas is bounded on one side by oil and on the other by water. The net effect between A and B is then:

$$P_B - P_A = \frac{2}{R}(\gamma_A \cos\theta_A - \gamma_B \cos\theta_B) \qquad (5)$$

and again if $\gamma_B \cos\theta_B$ were greater than $\gamma_A \cos\theta_A$ a positive pressure drop from A to B would be necessary to initiate flow to the right.

It should be noted that absolute pressures are not considered here. The absolute pressures at A and B could be of the order of thousands of pounds. The magnitude of the pressure drop between points A and B is the significant number in considering whether a channel would be blocked by the Jamin effect. The over-all effect is of course increased in direct proportion to the total number of bubbles that exist in a given channel.

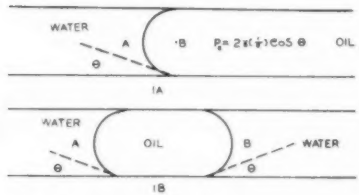

Fig. 1

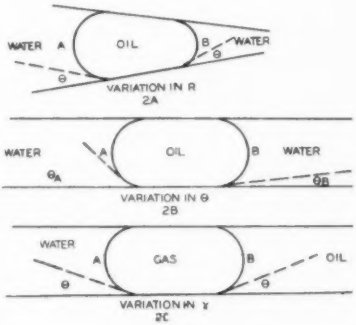

Fig. 2

Series by Dr. John C. Calhoun, Jr., Chairman, Petroleum Engineering School, University of Oklahoma

N.B. While it is axiomatic that return on investment—the *ultimate earning power* of a refinery unit when actually on stream—is the only true evaluation of competitive engineering recommendations, initial plant costs remain a major factor in refiners' decisions on plant installations. M. W. Kellogg takes specific steps to *minimize initial plant costs* consistent with the achievement of *highest ultimate earning power*.

A THREE-WAY PIPE STORY!

Consider for a moment that piping accounts for about one quarter of the cost of the average installation.

That can put piping in the million and often multi-million dollar class. If savings of from 10 to 20% can be effected, refiners will realize important economies, particularly attractive in these days of high costs.

Of course, accurately computing specific savings on a piping job is virtually impossible. There are too many variables. But Kellogg today estimates that its methods of field fabricating lop upwards of 15% off the cost of refinery piping work.

Here's why.

First, pipe is bent on the site as needed. No waiting for key pieces to arrive. Even one day saved over the course of the entire job represents a sizable sum both in labor savings and in the refiner's operating revenue.

Second, the shop overhead of the plant where such pipe would normally be fabricated, is dispensed with entirely.

Third, Kellogg's own crews handle the piping fabrication in the field, hiring necessary supplementary craft labor on an hourly basis. Thus there are no sub-contractors' fees pyramiding on the cost of the job.

There are still other advantages such as savings in shipping straight pipe rather than space-consuming, odd shapes, and they all add up to money in the bank for the owner.

Kellogg's development of field fabricating techniques sounds rather obvious and certainly simple when explained this way—but it wasn't. The move required that shop equipment be duplicated in mobile form, that shop techniques and quality standards be duplicated under field conditions subject to both the weather and the physical idiosyncracies of each job site.

Such an operation as this is only possible when backed, organized and controlled by a *complete* organization—such as that of M. W. Kellogg—where all types of specialists are available for handling the myriad problems involved. These savings effected in field fabrication of piping provide further proof that *completeness and integration of the engineer-contractor* are the keys to LOW INITIAL PLANT COST.

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Cost-imating

A WEEKLY FEATURE OF THE OIL AND GAS JOURNAL

Filter-Press Costs (Petrochemical)

SUBSTANTIALLY all of the cost data available are those of Chaplin Tyler, "Chemical Engineering Economics," First Edition 1936, Third Edition 1948 (McGraw-Hill Book Co., Inc., New York) and of Harding Bliss (Chemical Engineering, December 1941, page 88, brought up to date in Chemical Engineering, May 1947, page 126, and he prepared Tyler's chapter on Process Equipment Costs). However, the costs are not consistent and it was judged that the 1947 costs of the Third Edition of Chemical Engineering which are shown here are more representative of 1946 than of 1947 costs.

The costs of cast iron plate-and-frame presses shown in the tabulation should be multiplied by the following factors when using other metals:

Aluminum	1.70
Bronze	2.75
Lead	2.50
18-8 stainless steel	5.50

Approximate installation and accessory costs are also stated by H. Bliss and Chaplin Tyler as percentages of the costs of the filters.

	Per cent	
	Installation	Accessories
Sweetland	30	25
Plate-and-frame	30	25-30
Oliver	30	already included

The cost of motors may be obtained from Cost-imating Nos. 30 and 31 of May 12 and May 19. Indexes of the changes of costs of machinery during the years have been published in Cost-imating No. 1, October 21, 1948, and "Machinery Cost Indexes," The Oil and Gas Journal, February 17, 1949, page 132, but no indexes directly based on filter presses are available.

APPROXIMATE COST (DOLLARS PER SQUARE FOOT) OF FILTER PRESSES (1946)*

	Total filter or drum area, square feet											
	20	30	40	60	80	100	200	300	400	600	800	1,000
Sweetland presses†—cast iron plates and cotton cloths:												
2-in. spacing			22.00	20.00	18.00	16.50	13.00	10.50	9.50	8.50	8.00	8.00
4-in. spacing	34.00	32.00	30.00	27.00	25.00	23.00	16.00	14.00	12.00	10.00		
Oliver—without motor:‡ Steel and wood drum						56.00	32.00	24.00	21.50	19.50	18.00	
Recessed plate and frame presses—cast iron, center feed plates:												
12-in. plate— 1.68 sq. ft.	10.70	8.70	7.70	6.90								
18-in. plate— 3.90 sq. ft.			7.80	6.20	5.30	4.80	4.00					
24-in. plate— 7.03 sq. ft.					6.00	5.00	3.50	3.00	2.70			
30-in. plate—10.50 sq. ft.					7.40	6.00	4.00	3.30	3.00	2.50	2.20	
36-in. plate—15.60 sq. ft.						7.20	4.70	3.60	3.10	2.60	2.40	2.20
42-in. plate—22.00 sq. ft.							5.90	4.40	3.80	3.10	2.80	2.50
Plate and frame presses—cast iron plates and frames:												
12-in. plate— 1.68 sq. ft.	12.00	10.00	9.00	8.00								
18-in. plate— 3.90 sq. ft.			10.00	8.00	7.00	6.30	5.40					
24-in. plate— 7.03 sq. ft.				7.20	6.50	6.00	4.20	3.80	3.60			
30-in. plate—10.50 sq. ft.						7.00	4.70	4.00	3.70	3.30	3.10	
36-in. plate—15.60 sq. ft.							5.00	4.10	3.70	3.10	2.90	2.80
42-in. plate—22.00 sq. ft.							6.30	5.00	4.30	3.50	3.20	3.00
Plate and frame presses—yellow pine plates and frames:												
12-in. plate— 0.91 sq. ft.	15.00	13.00	12.00	11.00								
18-in. plate— 2.48 sq. ft.		11.00	9.00	7.30	6.40	5.90	4.50					
24-in. plate— 4.82 sq. ft.		14.00	11.00	8.10	6.70	5.80	3.70	3.30				
30-in. plate— 7.58 sq. ft.				9.70	7.60	6.30	3.70	3.00	2.60			
36-in. plate—10.60 sq. ft.					8.10	7.30	4.90	3.60	2.90	2.10	1.90	1.80
42-in. plate—15.10 sq. ft.						9.00	5.30	4.00	3.20	2.70	2.30	2.10

*The costs given in this table are stated by Harding Bliss and Chaplin Tyler to be 1947 costs but the situation is not clear. †Standard sizes of manufacturers should be consulted because the costs are not a smooth function as indicated here. ‡But otherwise complete with steel tank, vacuum receiver, trap, and feed and vacuum pumps.

No. 33 in a series by W. L. Nelson, professor of petroleum refinery engineering, University of Tulsa

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PIPE LINES

Selections of Diameters for Crude-Oil Lines Discussed

Methods for determination of diameters for crude-oil pipe lines were discussed by F. C. Whiteside, assistant chief engineer, Interstate Oil Pipe Line Co., in a paper entitled "Economic Sizing of Oil Pipe Lines" presented before the Pipeliners Club of Tulsa recently.

The most economical line, Whiteside said, would be just adequate to carry the peak throughput from fully developed production. Inadequate lines result in wasteful additions to the original plant as subsequent development occurs. However, practically every pipe-line system of any extent built prior to the war was built too small.

The greatest part of a pipe-line system investment is in the lines themselves. In view of this and the natural difficulty in appraisal of the throughput from a new area at the start, and of the absence of economic compulsion to develop the basics of pipe-line economics it is easy to see why lines were laid too small. This resulted in station spacings which were too close, operating costs too high, and subsequent wasteful loopings of the pipe-line system as development progressed.

Improvement in design and operating practices in some companies has injected heavier competition into the rivalry between lines transporting oil in the same general direction which has driven tariffs downward as persistently as wages and material costs have been rising. The most efficient pipe-line system with the longest hauls and largest throughputs naturally have the lowest operating cost per barrel mile. Pipe-line systems in the same general service must meet competition of the most efficient line.

The author proposed a method for presenting the general pipe-line problem in such a way that it may be roughly estimated. Modern fundamentals in pipe-line economics bracket the line size within narrower limits, thereby reducing the number of proposals necessary to be worked out in complete detail. For this study, graphically presented, some of the assumptions were as follows:

The length of line was assumed to be 1,000 miles so that figures would be fairly applicable to any length except the very short line which always is a special case. All sizes of pipe were covered from 8-in. to 30-in. inclusive. Most recent construction practice was followed which calls for pipe walls telescoped to ¼-in. thickness on the receiving end. A.P.I.-5LX46 pipe is considered preferable since no instances were discoverable of difficulties in welding it; prices for such steel, having a yield point of 46,000 psi. are not greatly different from those required for the older Grade B at 35,000 psi. yield.

The practice with respect to the

Construction operations of Associated Pipe Line Contractors, Inc., supervised by J. A. Williamson, superintendent, and L. D. Gray, spread man, for the laying of 122-mile, 26-in. Lebanon-Somerset, Ohio, loop for Texas Eastern Transmission Corp. Men in the foreground of the photo are William Lynch, assistant ditch foreman, R. J. Allen, crane operator, and D. M. Comer, helper

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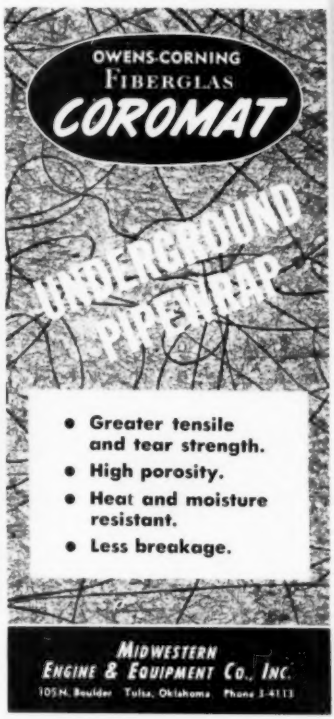

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safety factor to which the steel is stressed varies widely. The A.S.A. code for pressure piping calls for 85 per cent of the yield point. This has been used successfully in smaller lines. Most companies laying larger lines use something like 65 per cent of the yield. This study uses 85 per cent for Grade B, which also corresponds to 65 per cent for X-46 steel, so that these figures may be considered applicable to both these two conditions.

Operating practices assumed the crew to consist of one man on duty at a time until the station size becomes such that more than two 1,200-hp. units would be required. Under optimum pressure determination, 7 per cent was considered a fair rate of return on investment.

The demonstration of the existence and magnitude of optimum pressure is one of the interesting developments in this study. The size of the line that should be employed is larger than used in most earlier installations and larger than in some of the recent ones. It is also interesting that as volumes increases, a larger size line becomes more economical before the minimum tariff is reached for the preceding smaller size.

After presenting charts regarding tariffs, investment, station spacing, and optimum pressures, the author gave an example of determining the proper line size for a 110,000-bbl.-per-day throughput for 60 S.U.S. Mid-Continent crude oil in a 1,000-mile line. Operating costs were shown for four different diameters with their effect on payout of the investment:

By comparing such an 18-in. line costing $34,900,000 with such a 20-in. line costing $36,800,000, the operating cost of 7.6 cents per barrel would be 1 cent less per barrel, thus effecting an annual saving of $402,000, amounting to $241,000 after deducting 40 per cent income tax which would result in paying out the investment in 7.9 years.

This 20-in. line with an operating cost of $3,051,000 would not only be preferable to the 18-in., but it would also be preferable to a 22-in. line for this particular service. For the 22-in., line would cost $2,800,000 more than the 20-in., with 0.4 cent greater operating cost per barrel. Operating cost amounting to $160,000 annually ($96,000 after income tax), which would indicate a 29-year payout for the 22-in. line in this case.

Pipe Lines Contracted And Which are Under Way

The scale of active pipe-line construction programs in the United States is indicated by the fact that projects under way and recently contracted in the United States total approximately 7,335 miles, while those in foreign countries total 3,265 miles; these together total 10,600 miles for domestic and foreign lines.

Tables showing all the principal projects in the world (completed in 1949, under way, and planned for the future) totaling 45,280 miles have been presented in recent issues of The Oil and Gas Journal, including natural-gas pipe lines, *"Gas-Line Construction Activity at Highest Point Since 1931," page 66, May 12 issue);* petroleum pipe lines, *("5,450 Miles of Crude, Product Lines Now Under Construction," page 58, May 26 issue).*

The following projects include those now under way or recently contracted. Dates (where given) in-

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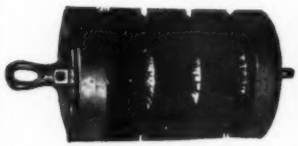

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PIPE LINE SURVEYS

dicate scheduled completions. Contractor's name is also given:

Crude-oil pipe lines.—Atlantic Pipe Line Co., 420 miles of 10-in., Holder-Evans & James—Crane to Harbor Island, Tex.; September 10, 1949.

Buckeye Pipe Line Co., 82 miles of 22-in., Anderson Brothers—Lima to Toledo, Ohio.

Interstate Oil Pipe Line Co., 85 miles of 12-in., C. B. Edmonds Transportation Co.—Elk Basin to Billings, Mont.

Pasotex Pipe Line Co., 22 miles of 6-in., Scurry County, Texas.

Phillips Pipe Line Co., 44 miles of 8-in., Bill Morrison Construction Co.—Wichita to Kansas City, Mo., loops, June 25, 1949.

Phillips Pipe Line Co., 289 miles of 12-in., Morrison Brothers—Odessa to Borger, Tex., May 1949.

Shell Pipe Line Corp. (Ozark), 435 miles of 22-in., Smith Contracting, Anderson Brothers.—Cushing, Okla., to Wood River, Ill.

Magnolia Pipe Line Co., 26 miles of 8-in., Mitchell and Scurry counties, Texas.

Stanolind Pipe Line Co., 31 miles of 10-12-in., C. S. Foreman—Elmont and Blaine stations, Kansas, loops.

Texas Empire Pipe Line Co., 183 miles of 18-in., H. C. Price Co., Anderson Brothers Construction Co., Bechtel Corp., Conyes Construction Co.—Patoka to Wilmington, Ill.

Texas Empire Pipe Line Co., 55 miles of 22-in., Sheehan—Patoka to Wood River, Ill., August 1949.

Sinclair Refining Co., 270 miles of 8-in., company crews and outside contractors—Redel, Kans., to Wood River, Ill., recondition crude line for products, February 1, 1949.

Tuscarora Oil Co., Ltd., 21 miles of 10-in., Pipe Line Construction & Drilling Co.—East Waterford, Pa., West, June 1, 1949.

Atlantic Seaboard Corp. and Virginia Gas Transmission Corp., 268 miles of 26-in., H. C. Price, Ray L. Smith & Son—Clendenin, W. Va., to Rockville, Md.

Atomic Energy Commission (United States Government), 95 miles of 12-in., Morrison-Haddock Engineering Co.—Bloomfield to Los Alamos, N. M.

Cities Service Gas Co., 130 miles of 26-in., R. H. Fulton & Co.—Newton-Ottawa, Kans., Indianapolis, Ind., to Texas Eastern Transmission Corp. system.

El Paso Natural Gas Co., 450 miles of 30-in., company crews—Eunice, N. M., to Blythe, Calif., looping, 1951.

El Paso Natural Gas Co., 130 miles of 6-8-10-in., company crews—Wilcox to Globe, Ariz.

Hope Natural Gas Co., 32 miles of 16-in., Pipe Line Construction & Drilling Co.—Hastings to Clarksburg, W. Va.

Hope Natural Gas Co., 13 miles of 14-in., Pipe Line Construction & Drilling Co.—Hasting to south, July 1, 1949.

Houston Pipe Line Co., 67 miles of line, Latex Construction Co.—Village Mill, Tex., area.

Kansas Light & Power Co., 146 miles of 20-22-in., M. J. White—Ulysses to Pratt, Kans.

Lone Star Gas Co., 70 miles of 20-in., Eastern Construction Co.—Opelika to Greenville, Tex.

Manufacturers Light & Heat Co., 86 miles of 6-12-in., Williams Brothers Corp.—Port Jervis to Nyack, N. Y.

Manufacturers Light & Heat Co., 30 miles of 6-12-in., Britton Construction—Majorsville, Pa., area, June 1, 1949.

McCarty Oil & Gas Co., 100 miles of 12-14-16-20-in., Anderson Brothers—Jackson Pasture to Orange, Tex.

Michigan Gas Storage Co., 113 miles of 20-in., Mahoney Construction—laying 61 miles, Freedona-Laingsburg-Lansing, Mich., area.

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24-in., J. R. Horrigan—Marysville to Grant City, Mo.

Michigan Wisconsin Pipe Line Co., 170 miles of 24-in., J. R. Horrigan—Sandwich Junction, Ill., to Mount Pleasant, Iowa.

Michigan Wisconsin Pipe Line Co., 180 miles of 22-in., J. R. Horrigan—Milwaukee to Burlington, Wis.

Michigan Wisconsin Pipe Line Co., 180 miles of 22-in., Oklahoma Construction Co.—Big Rapids, Mich., to Crown Point, Ind.

Natural Gas Pipeline Co. of America, 27 miles of 26-in., Midwestern Construction—main-line looping, Iowa and Illinois.

Northern Natural Gas Co., 135 miles of 20-24-in., G. G. Griffis Construction and Eastern Construction—Iowa, Minnesota Kansas, Nebraska.

Ohio Fuel Gas Co., 88 miles of 20-in., Midwestern, Anderson Brothers—Crawford-Lick station, Ohio; Lick-South Point stations, Ohio.

Ohio Fuel Gas Co., 48 miles of 20-in., Mahoney—Mount Gilead to Treat station; Pavonia station to Washington, Ohio.

Oklahoma Natural Gas Co., 65 miles of 12-in., Trojan Construction—Chandler to Blanchard, Okla.

Pacific Gas & Electric Co., 510 miles of 30-34-in., Bechtel-Price-Conyes—Toprock, Ariz. to Milpitas, Calif., 1950.

Panhandle Eastern Pipe Line Co., 188 miles of 26-in., R. H. Fulton—Liberal to Emporia, Kans., loops.

Panhandle Eastern Pipe Line Co., 38 miles of 26-in., C. S. Foreman Co.—LaMine, Mo., area.

Panhandle Eastern Pipe Line Co., 45 miles of 26-in., Anderson Brothers—Ft. Wayne, Ind.

Southern Natural Gas Co., 61 miles of 24-in., O. C. Whitaker Co., Latex Construction Co., Baxterville, Miss., eastern Alabama loop.

Southern Union Gas Co., 32 miles of 10-12-14-in., R. H. Fulton, H. B. Zachry, J. W. Walton—Albuquerque, Santa Fe, Roswell, N. M., loops.

Stanolind Oil & Gas Co., 137 miles of 22-24-in., Deaton & Sons—Ulysses, Kans., April 1, 1949.

Tennessee Gas Transmission Co., 62 miles of 24-30-in., H. C. Price—Refugio to Victoria, Tex., August 1, 1949.

Texas Eastern Transmission Corp., 122 miles of 26-in., Associated Pipe Line Contractors—Lebanon to Somerset, Ohio.

Texas Eastern Transmission Corp., 55 miles of 26-in., Williams Brothers—Bealville to Woodsfield, Ohio, looping.

Texas Transmission Corp., 723 miles of 26-in., Latex, O. C. Whitaker, J. R. Horrigan, Williams Brothers, Midwestern Construction—Lisbon, La., to Middletown, Ohio.

Texas Gas Transmission Corp., 110 miles of 20-in., N. A. Saigh—Carthage, Tex., to Lisbon, La.

Transcontinental Gas Pipe Line Corp., 1,840 miles of 20-30-in., Contracts for 600 miles of 30-in. have been let as follows: Morrison Brothers Construction Co., 171 miles, Eunice, La., to Jefferson County, Mississippi; G. G. Griffis Construction Co., field office Laurel, Miss., 112 miles, Mississippi and Alabama; Midwestern Constructors, Inc., field office, Demopolis, Ala., 207 miles, Alabama and Georgia; Williams Brothess Corp., will start on a 110-mile section in Georgia in September.

Foreign pipe lines.—Direccion General del Gas del Estado, 1,100 miles of 10-in., Tecnica and government crews—Comodoro Rivadavia to Buenos Aires, Argentina.

Iraq Petroleum Co., Ltd., 1,080 miles of 16-in., company crews—Kirkuk, Iraq, to Haifa, Palestine, and Tripoli, Lebanon.

Kuwait Oil Co. (Gulf and Anglo-Iranian), 600 miles of 4-30-in., Bechtel—Kuwait, Arabia.

Trans-Arabian Pipe Line Co., 1,070 miles of 30-31-in., Bechtel—Abqaiq, Saudi Arabia, to Sidon, Lebanon.

United Kingdom Government, 150 miles of 6-in., Shell Petroleum Co. supervision—Mtwara, near Lindi, to Ground Nuts area, Tanganyika, Africa.

Yacimientos Petroliferos Fiscales de Bolivianos, 255 miles of 6-in., Williams Brothers—Camiri to Cochabamba to Sucre, Bolivia.

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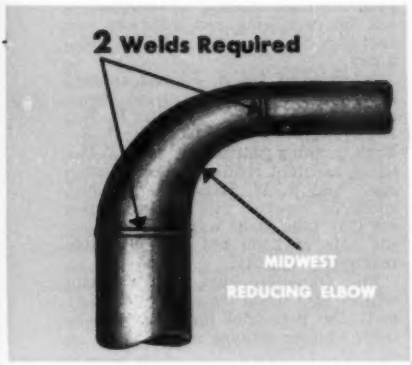

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REFINING

Phillips Lube Plant Is Now in Full Operation

THE new lubricating-oil plant of Phillips Oil Co., subsidiary of Phillips Petroleum Co., which was officially opened at the Kansas City, Kans., refinery on May 6, is now in full operation.

Completely new from the ground up, the plant consists of processing units, blending facilities, and packaging equipment.

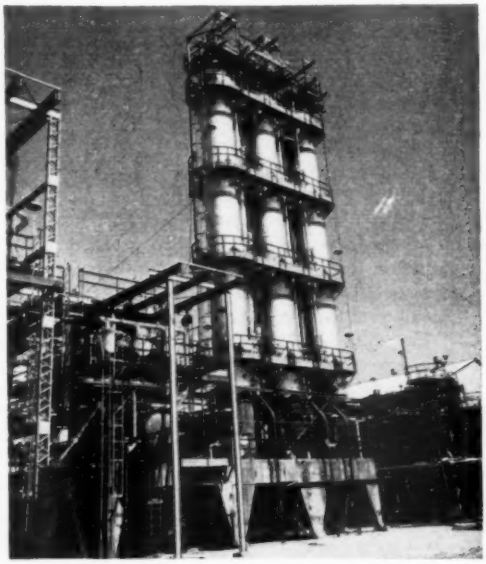
The blending and packing building (see photo) is 405 by 225 ft. and is designed for around the clock "assembly line type" production. In one third of the building are facilities for handling cans and drums. In another third is all the equipment for blending, filling and packaging. There are four automatic blending units and each can handle up to three base oils and three additives simultaneously, as desired. There are three canning machines: a 1-qt. 150-can-per-minute, a 1-qt. 250-can-per-minute, and a 5-qt. 35-can-per-minute machine. In the storage and shipping section there are six truck-loading docks; boxcar orders are loaded directly by electric-fork trucks.

The lube-oil manufacturing plant itself contains these processing sections: vacuum distillation and deasphalting, phenol extraction, propane dewaxing, and clay treating. Base oils are transferred from the manufacturing section of the package building via lines enclosed in a steam heated concrete pipe trench; all outside lines at the compounding plant are steam traced and insulated, for ease in winter operation.

Phillips now operates eight refineries: Phillips, Tex.; Kansas City, Kan.; Okmulgee, Okla.; Sweeny, Tex.; Salt Lake City, Utah; Pocatello, Idaho; Spokane, Wash.; and Great Falls, Mont. Their combined capacity has been increased steadily through various improvements and additions so that they can now process 167,000 bbl. a day.

Interviewed by a Journal representative during the dedication ceremonies, K. S. Adams, president; W. W. Keeler, refining vice president; J. E. Bogk, refining general manager; W. H. Creel, assistant refining general manager; and R. W. Henry, lubrication specialist, reported that the new Kansas City lube plant was operating at the rate of 2,000 bbl. per day, its maximum capacity.

The Okmulgee lube-plant section will be shut down the middle of July and lube personnel there placed at other Phillips refining operations.



Partial view of new lube-processing section at Phillips Oil Co.'s Kansas City, Kans., refinery. Processing units include vacuum distillation and deasphalting, phenol extraction, propane dewaxing, and clay treating. The new blending and packaging building nearby contains 2,673,000 cu. ft. (For detailed article see the Journal's Annual Refining Issue, March 24, 1949, page 244, et seq.)

Army Contract Closed

An Army contract between Chicago Quartermaster Purchasing Office and Precision Scientific Co., Chicago, was closed recently for four mobile petroleum laboratories, costing an estimated $100,000 each.

New-Type Lubricants, Diesel Fuels Foreseen

NEW YORK.—A trend toward diesel fuel oils of lower A.P.I. gravity was predicted last week by C. M. Larson, chief engineer, Sinclair Refining Co., at a diesel-engine conference conducted by the Society of Automotive Engineers here May 26.

Higher power output in future lower-compression-ratio diesel engines will be obtained by using a fuel with maximum B.t.u. content per gallon—a heavier oil.

The increasing demand for higher-specific-output diesel engines without increase in maintenance or sacrifice of reliability, has created a problem for the oil industry, Larson stated. This product improvement is superimposed on a growing volume demand for diesel fuel, consumption of which has trebled in the past 7 years.

Research on diesel fuel and its additives was declared to be at about the same stage as the study of gasoline and its additives 15 years ago. While the trend in gasoline engines is toward higher compression ratios, the trend in diesel engines is just the reverse. With these lower compression ratios, blowers or superchargers will be used with much higher induction pressures than ever before. This will require much higher cetane-number fuels but will give higher specific output with much less weight per horsepower.

Superior diesel fuels with still more additives will be required for engines of the future. Maximum power and minimum consumption demands can be met with those high-specific-gravity fuels having maximum B.t.u. content. But such fuels cause shock and pressure waves which damage piston lands and rings and eat up piston heads. Cetane adjustment by means of further additives will render such heavy fuels usable.

Such diesel fuels, with ignition quality additives and starter aids for cold-engine starting, are in the making, Larson stated. They will allow the manufacture and operation of new lower compression ratio designs for higher specific power output.

A new series of severe-duty-type lubricating oils will appear in July. Designed to overcome idle-cold engine sludge, overload deposits, and excessive-wear conditions, these oils will meet all the requirements of U. S. Army Spec. 2-104B and Supplemental List I. They may be employed with high-sulfur fuel oil, but should not be confused with the still higher additive level of Series II motor oils to be used in connection with the Caterpillar supercharged engine where high-sulfur fuels are met. This gives two levels higher than 2-104B heavy duty type motor oils; one with twice the amount of additives, and the other with three times the quantity.

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Completion Scheduled Soon On New Bayway, N. J., Unit

Completion is scheduled within the next week on a new 49,000-bbl.-per-day vacuum-distillation unit at the Bayway, N. J., refinery of Esso Standard Oil Co. Constructed by C. F. Braun & Co., the new unit is one of the largest of its kind in existence.

The unit will process reduced crude from existing atmospheric-distillation units at the refinery, producing a heavy distillate gas oil for charging to the new fluid catalytic cracking unit nearing completion at the same refinery.

Process employes who will take over the unit in early June have just completed a month's training course which included classroom instruction, field work, and study of a model of the new unit showing all flow lines and controls.

Other recent completions in the current Bayway expansion program include: a large capacity salt-water pump, a new 60-in. salt-water line connecting the salt-water pumping station with the refinery process area, and a new boiler at the west side boiler house.

Ethyl Makes Fourth Price Cut on Antiknock Compound

The fourth price reduction this year on tetraethyl lead compound was announced May 27 by Ethyl Corp.

The new price cut reduced motor-mix compound to 55¾ cents per pound, compared with its previous price of 57 cents, in effect since May 9.

Refinery Resumes Operation

Quaker State Oil Refining Corp.'s Independent Plant at Oil City, Pa., last week resumed full operation after a month-long shutdown caused by a lack of sufficient demand for Pennsylvania Grade crude products. All employes are back at work. A third of the payroll was maintained during the shutdown for repair and maintenance work.

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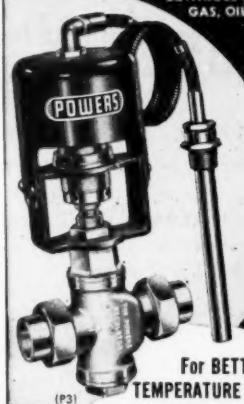

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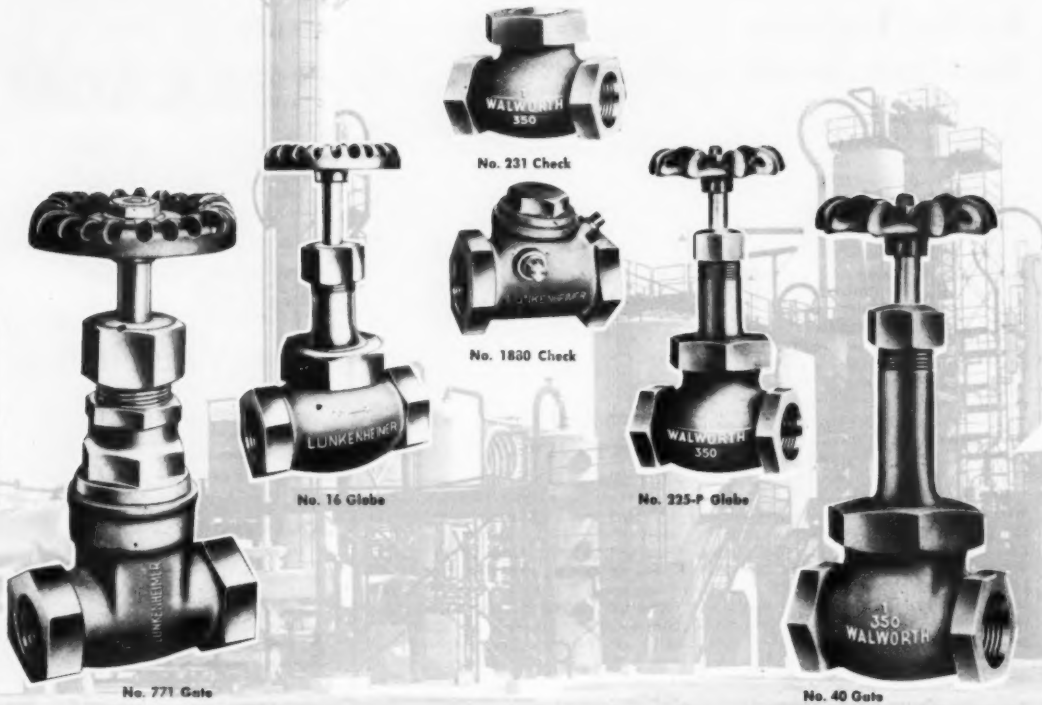

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NATURAL GAS

Change to Natural Gas By AEC Is Criticized

WASHINGTON.—A joint Senate-House committee on atomic energy severely criticized the Atomic Energy Commission last week for insisting on fueling its plant at Oak Ridge, Tenn., with natural gas brought over a distance of 150 miles when it is practically sitting on top of ample coal supplies.

Investigation of the plan to use natural gas at the Oak Ridge plant was only a small part of an over-all probe of AEC administration which grew out of disclosures that AEC scholarships, some of which might involve access to important material on atomic energy, had been awarded to communists and that a small amount of fissionable material had been lost.

A subcommittee composed of Reps. Carl T. Durham of North Carolina, chairman; Melvin Price of Illinois, W. Sterling Cole of New York, and James E. Van Zandt of Pennsylvania prepared the report, which received the unanimous approval of the full committee, on the commission's plan to have a pipe line built from Tennessee Gas Transmission Co.'s main line in northwestern Tennessee to the Oak Ridge plant to supply 60,000,000 cu. ft. of gas daily.

Construction of the line was opposed before the Federal Power Commission by coal and railroad interests, whose objections were supported by the subcommittee. The subcommittee found four grounds for criticizing the AEC, as follows:

1. Adequate coal stock piling appears to be feasible at the plant to insure continuous power-plant operation.

2. Reliance on fuel sources outside the local area does not appear compatible with the original selection of the Oak Ridge site or in the best interests of common defense and security.

3. The commission's action was taken without consultation with the National Security Resources Board.

4. Substantial improvement in the national fuel picture in the past 18 months has not been reflected in the commission's action.

To guard against the undertaking of injudicious projects by the commission in the future, the subcommittee recommended that legislative action should be required whenever its proposals and programs have "major economic, security, or production importance."

The commission defended its project before the Federal Power Commission on the ground that it needed an assured adequate supply of fuel, but the subcommittee held that would not be assured by the gas line and raised the question why it was felt necessary to convert Oak Ridge to gas when another plant operated by the AEC in Tennessee will be left on coal.

The subcommittee report pointed out that risks of explosion, fire, or other catastrophe are involved in dependence on a natural-gas line, as well as the possibility of a lack of assured and adequate supply of fuel in the event of a natural-gas shortage.

The report also referred to the possibilities of mechanical failures, sabotage, and labor difficulties at Oak Ridge and commented that the provisions to insure against these risks apparently are not foolproof. However, it conceded, some risk to the plant from internal or external sources inevitably remains after all conceivable precautions have been taken.

Radio-Frequency Allocations To Be Determined by Board

Following the recent allocation by the Federal Communications Commission of radio frequencies for the petroleum and natural-gas industries, the National Petroleum Radio Frequency Coordinating Committee has been organized to determine the manner in which these frequencies will be assigned to various operations. H. A. Rhoades, Humble Pipe Line Co., Houston, is temporary chairman of the national committee.

For pipe lines, frequencies will be available for gathering and trunk lines for crude oil, products, and natural-gas services; other industry operations entitled to obtain frequencies include geophysical exploration, drilling, production, and refining.

To facilitate determination of frequency allocation the national committee has appointed several regional committees. A meeting of the Region 5 Petroleum Radio Coordinating Committee will be held at the Mayo Hotel, Tulsa, June 3 at 9 a.m. Other regional meetings will be held soon. These will be open to those eligible to procure petroleum radio service. E. E. Comstock, Phillips Petroleum Co., Bartlesville, Okla., will preside at the Tulsa meeting as temporary chairman. Region 5 comprises the following states: Oklahoma, Kansas, Nebraska, North Dakota, South Dakota, Minnesota, Iowa, and Missouri.

Region 4 comprises the following states: Texas, Arkansas, Louisiana, and Alabama.

85-Mile Gas Pipe Line Is Authorized for San Diego

Federal Power Commission has authorized construction of pipe-line facilities in southern California, which will make available to the San Diego area an additional 40,000,000 cu. ft. of natural gas daily.

The authorization covers an 85-mile line, to be built by San Diego Gas & Electric Co., and Southern Counties Gas Co. of California. Under a joint plan, San Diego will construct approximately 50 miles of line in San Diego County and Southern Counties Co. will build the remaining 35-mile section of the project in Riverside County. Over-all line will connect with an existing pipe line of the Southern Counties system near Moreno, Calif., and will extend to San Diego.

Southern Counties Gas presently delivers up to 33,000,000 cu. ft. daily to the San Diego company from California fields through an existing pipe line. The gas to be transported through the proposed facilities will originate in the Panhandle field of Texas, and in the Permian Basin in Texas and New Mexico, where large quantities of gas produced in conjunction with oil are vented to the air.

Southern Counties Co. estimates cost of its portion of the project at $1,931,700, and estimated cost of the 50-mile section to be built by San Diego Gas & Electric is $3,037,500.

Home Gas Co. Given Permit To Build New Gas Line

Authorization to construct approximately 52 miles of natural-gas pipe lines in Orange, Sullivan, and Rockland counties, New York, has been given to Home Gas Co., subsidiary of Columbia Gas System, Inc., by Federal Power Commission.

The commission also granted authorization to retire and sell other facilities.

Home Gas was authorized to retire 44 miles of line which forms an 11-mile transmission system in Orange County, and to sell approximately 10 miles of line in Cattaraugus County, New York, to Keystone Gas Co., Inc.

Eastern Pipe Line Co., also a Columbia subsidiary, was given permission to retire 140 miles of system which extends from a point on the New York-New Jersey line in Sussex County, southeast through New Jersey to another point on the state line in Bergen County.

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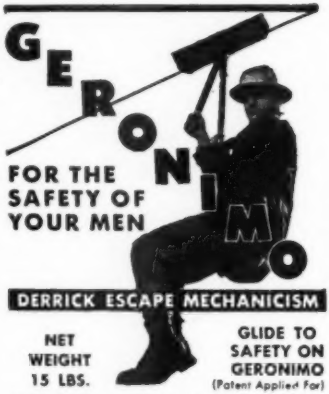

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Among the Drilling Contractors

New Contracting Firm Incorporated in Canada

Formation in Canada of a new drilling contracting corporation to be known as the Trans-West Drilling Corp., Ltd., has been announced by C. B. Harcourt, vice president. Headquarters are at Vancouver, B. C., and other principal offices have been set up at Calgary and Edmonton, Alta., and at Long Beach.

The new corporation, capitalized at $200,000, has taken over the assets of the B. J. Henning Drilling Co. B. J. Henning, former owner of the latter company, is one of the incorporators and general superintendent of the new corporation. Operations are being started with two rotary power rigs, one having a rated depth capacity of 7,500 ft., and the other 5,000 ft. The latter is drilling under contract for Royal City Oil & Gas Co., Ltd., on Lulu Island, B. C. The other is being moved to Alberta Province where several contracts are pending.

In addition to contracting, the corporation has properties which it will develop for its own account.

ROTARY RIGS IN OPERATION*

(United States and Western Canada)

Area—	Week ended 5-23-49	Change week ended 5-16-49	Change week ended 5-24-48
Gulf Coast	540	— 1	+14
W. Tex.-N. M.	534	—17	—37
Ark.-N. La.-E. Tex.	153	+ 2	—10
Oklahoma	261	— 1	—28
Kansas	118	— 2	—26
Illinois-Eastern	141	+24	+26
Rocky Mountains	108	— 2	—43
Pacific Coast	174	—22	+ 4
Total U. S.	2,029	—19	—100
Western Canada	79	— 1	+40
Total	2,108	—20	—60

*Courtesy Hughes Tool Co.

Teepee Drilling Co., Oklahoma City, operating for itself, is opening a new oil pool in the southern part of Cleveland County. The discovery well, shown at the right, is 1 Warner, C SE NE 4-6n-1w, 2 miles east and a quarter mile north of Lexington. In the foreground is the airplane owned by Indian Drilling Mud Co., Inc., an affiliated mud servicing company. As this is written, the well is testing showings in the Hunton zone at 6,633-55 ft., from which, on a drill-stem test it recovered 90 ft. of 45° oil and 90 ft. of oil-cut mud

Neal Drilling Co. has contract for a 6,500-ft. wildcat test to be drilled for Forest Oil Corp. in northwestern McMullen County, Southwest Texas. It is 6 miles west of Tilden.

W. C. Patton, Stillwater, Okla., has been awarded contract by Deep Rock Oil Corp. to drill 1 Flora Duncan, a wildcat in the NE SW SE 12-18n-4e, Payne County, Oklahoma.

White-Webb Drilling Co. has contract to drill a second test for Bobby Manziel in the S. Yarbrough Survey, Wood County, East Texas. The new location, 1 W. D. Cain, is a northeast offset to the first test, 1 Maud Thompson, which is being completed as the discovery well for sub-Clarksville production in the area. The same rig will be used. **Coats & Harrell** have contract to drill a sub-Clarksville test, 1 Joe Carr, for F. R. Jackson and J. M. DeuPree in the James Colson Survey, 2 miles south of the discovery well.

Committees Named for A.A.O.D.C. Annual Meeting

Selection of committees to arrange for the ninth annual meeting of the American Association of Oilwell Drilling Contractors to be held in Dallas, September 19-21, has been announced by Joseph S. Morris, Allen & Morris, San Antonio, president.

Committees and their respective chairmen are: General arrangements, Louis A. Beecherl, McDaniel & Beecherl Drilling Co.; program, J. E. Brantly, Drilling & Exploration Co.; housing, J. L. Rush, Trinity Drilling Co.; registration, W. L. McClusky, M. J. Delaney Co.; finance, F. W. Brigance, Rowan Drilling Co.; entertainment, C. J. Paine, Paine Drilling Co.; banquet, Thomas J. Carter, Thomas J. Carter Drilling Co.; publicity, Roy Guffey, Roy Guffey Drilling Co.; transportation, George B. Rice, West Central Drilling Co., Inc.; ladies entertainment, Mrs. W. S. Churchill.

Ray-Harris Drilling Co., Dallas, is the contractor for Hiawatha Oil & Gas Co. on the latter's 1 W. C. Jones estate, a wildcat test in Section 190, District 11, SP Survey, Tom Green County, West Texas. Contract depth is 5,500 ft.

B & R Drilling Co., Wichita, has started a joint wildcat test with Wilcox Oil Co. in western Russell County, Kansas. The well, 1 Gorham, NW NW SW 18-13-15, is 3 miles northwest of the Gorham pool and 2½ miles south of the Fairport pool.

Wilbanks Drilling Co., Big Spring, Tex., is the contractor for Hickok & Reynolds, Inc., and Dan Auld on a deep, semiwildcat test being drilled on the east flank of the Bronte field, Coke County, Texas. Located on the Warren tract, it will test the Canyon, Strawn and other lower horizons.

Lodestar Drilling Co., Calgary, Alta., Canada, has been awarded contract to drill Socony-Vacuum's second test in the Craigmyle area of Alberta Province. The location is in LSD 9, 31-32-16w4, about a quarter mile west of the first test, which had encouraging shows.

Carl B. King Drilling Co., Midland, Tex., has contracted with Ryan, Hayes & Burke of San Antonio to drill an 8,500-ft. wildcat test in the 418-97 H&TC Survey, 9 miles northeast of Gail, Borden County, West Texas. Objective is the Ellenburger.

Watts Drilling Co., Arp, Tex., has contract for W. L. Pickers' Woodbend wildcat test to be drilled in the D. M. Friesman Survey, 4 miles east of Jewett, Leon County, East Texas. Contract is for 6,500 ft.

Standard-Fryer Drilling Co., Dallas, will drill 1 Iowa Realty Trust, a 6,000-ft. Ellenburger wildcat in northern Pecos County, West Texas, for Ted Weiner and associates. The location is 2½ miles west of the Apco-Warner Ellenburger field.

Drilling Contractors, Ltd., Calgary, Alta, Canada, has placed two more rigs to work for Home Oil Co. and Anglo Canadian Oils, Ltd., in the Woodbend area, southwest of Edmonton, Alta. Initial wells are Nos. 4 and 5 Woodbend.

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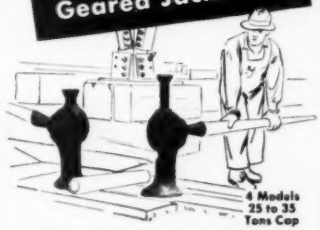

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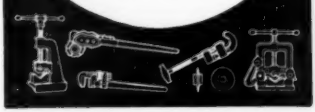

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Exploration and Drilling

D3 Production in Alberta Extended 90 Miles S.E.

OIL production at the rate of 73 bbl. per hour in the D3 coral-reef zone of the Devonian in the new strike of Canadian Gulf Oil Co. 1 Ellis (Stettler area), LSD 4, 10-38-20w4, some 90 miles southeast of Leduc field, extends the potential zone of D3 reef oil by as many miles in that direction.

The new strike topped the D3 zone at approximately 5,320 ft., and after coring to about 5,340 ft., set packer at 5,311 ft. for a drill-stem test. When the tester was opened, gas hit the surface in 3 minutes and oil in 15 minutes. After a short interval the flow was turned into tankage and the well made 73 bbl. of oil in the first hour, with gas estimated at 1,000,000 cu. ft. daily. During the next 3 hours flow varied from 55 to 60 bbl. per hour of about 28°-gravity oil. Coring and testing will continue, probably until the oil-water contact line is established.

This well had already established itself as a potential 1,000-bbl.-per-day producer of 30°-32°-gravity oil in a 50-ft. pay section of the D2 zone at about 5,180-5,230 ft. some 2 weeks previously.

The Ellis well was Gulf's second test of this anomaly. About 1½ miles southeast of LSD 16, 34-37-20w4, on January 24, 1948, it abandoned its 1 Jerard at 6,930 ft. after reportedly finding only slight oil stainings in the D2, and 514 ft. of D3 loaded with water. A recheck of the seismic information and a core-drilling program gave a different interpretation of the structure and led to the location of the Ellis success.

According to reports, the Ellis well found the top of the D2 zone about 90 ft. higher than in the Jerard. Drilling through the green shale, the Ellis kept gaining and topped the D3 at an estimated 180 ft. higher than the Jerard.

Alberta Government records on the Jerard dry hole give elevation 2,783 ft.; Belly River-Lea Park contact 2,210 ft; Lea Park-Colorado contact 2,670 ft.; second white speckled snale 3,390 ft.; Viking sand 3,810 ft.; Colorado-Blairmore contact 3,975 ft.; Blairmore-Madison contact 4,190 ft.; Exshaw 4,580 ft.; Devonian 4,610 ft.; D2 5,300 ft.; no further tops reported.

It is believed that the new strike is also the first D3 reef production found under the Madison. The previous D3 hits have all been updip toward the granite shield from the Madison pinchout. If the new strike is characteristic of a large area, this will dispose of the fear that good D3 Devonian production would be confined to areas where the Madison was gone. While no data has been released on the Madison thickness (if any) in the Ellis strike, the Jerard dry hole, only 1½ miles away, apparently showed 390 ft. of Madison present.

While the Ellis hit is claiming the limelight, neither Canadian nor Rocky Mountain operators are overlooking reports that a rank wildcat in extreme southwest Manitoba province had showings of oil. The well is Souris Valley Oil Co. 1 Gordon White freehold, SW 14-1-28w1, 2½ miles north of the United States boundary, some 9 miles east of the Saskatchewan-Manitoba border, about 2½ miles southeast of the village of Lyleton. The well is scheduled to go to at least the Devonian D3 or equivalent, anticipated at around 5,000 ft. Reports were that showings of oil were found in the Lower Cretaceous at around 2,200 ft., but that drilling was continuing.

This well is not too many miles away (for such extreme wildcats) from the Price Drilling Co. 1 Kline, SE SE SE 16-157n-85w, Ward County, North Dakota, in the Minot area, reported last week as having drilled saturated streaks in the Madison lime. Both wells are rank wildcats, and therefore the odds against either one or both hitting are very high. If both should hit, then both Canadian and Rocky Mountain operators will find the "hot play" jumping hundreds of miles from their current main activity.

HIGHLIGHTS OF WEEK'S DEVELOPMENTS

WEST TEXAS.—Cities Service 1-E Cowden, 1-mile north outpost to Dollar Hide field, found water throughout the Fusselman section of the Silurian and plugged back to test shallower oil shows before trying for completion in the Devonian. In eastern Coke County, Bronte got its first townsite drilling contract, despite the dry hole between it and the producing area, which stopped a previous run for locations. The 5,200-ft. test is on Lot 2, Block 43, owned by L. T. Youngblood, 1 block northeast of the bank building. It is about 1 mile northeast of nearest production in Bronte Palo Pinto field.

EAST TEXAS.—Mudge Oil Co. 1 Furrh extended Travis Peak oil production southwest of Waskom field, with a daily flowing potential of 450 bbl. of oil, said to be one of the largest producing wells in East Texas of recent date.

SOUTH LOUISIANA.—In the Gulf of Mexico, approximately 10 miles off Cameron Parish shore, Stanolind Oil & Gas Co. 1 Louisiana State Lease 1133, Block 45, opened a new gas-condensate pool, flowing 19 bbl. of 51.5°-gravity condensate with 1,880,000 cu. ft. of gas per day, through a 10/64-in. choke, with 3,000 psi. pressure on the tubing.

ROCKY MOUNTAIN AREA.—Ohio Oil Co. is running casing and will drill deeper at its Sidney area, Nebraska, wildcat, where saturation was reported in the Muddy last week. In Montana, Shell Oil Co. is plugging the deepest well ever drilled in the state, at 11,519 ft. The well is located on the Ash Creek structure, Big Horn County, on the northwest side of the Powder River Basin.

KANSAS

Graham County Wildcat Opens New Lansing Pool

OPENING of a new pool in M. B. Armer 1 Teall, NW NW SE 9-10-21, southeastern Graham County, has been established. The well got water in the Arbuckle at 3,817-22 ft., but plugged back to 3,595 ft., in the Lansing, in which casing was perforated at 3,528-34 ft. Placed on the pump, it made 112 bbl. of oil the first day, 70 bbl. the second day, and 60 bbl. the third day. Lansing was topped at 3,483 ft. (—1,254 ft.). Location is 3 miles northwest of the Morlan pool and 3½ miles south of the Morel pool.

Heller and B & R Drilling Co. 1 Carpenter, SE SE SW 13-11-23, a mile east of the Wakeeney pool, Trego County, made 51 bbl. of oil plus 6 to 8 bbl. of water per day in a potential test of the Lansing, topped at 3,524 ft (—1,255 ft.), and in which casing was perforated at 3,576-98 ft. The new pool has been named East Wakeeney. Arbuckle at 4,007-50 ft. was dry.

In the eastern part of Ellis County, Palmer Oil Corp. may have a new Arbuckle pool in its 1 Smith CSL SE SE 23-12-16, 1½ miles south of the Blue Hill pool. It is swabbing 1 bbl. per hour. Total depth is 3,375 ft. with Arbuckle topped at 3,354 ft. (—1,484 ft.).

Three-quarters of a mile southwest of production of the Chase pool, in Rice County, Henderson Oil Co. 1 Proffitt, SW SW NW 13-20-10, also swabbed 1 bbl. per hour for another new pool opener. Production is from the Arbuckle at 3,339-45 ft. (—1,553-59 ft.).

K. T. Wiedeman found oil saturation in the Bartlesville sand at 3,123-38 ft. (elevation 1,173 ft.), in his 1 Stayton, SW SW NW 32-32-4e, 3 miles southwest of production in the State pool, Cowley County, and has run casing to 3,116 ft. preparatory to testing. The well is 15 miles north of the Oklahoma line.

In Sumner County, Atlantic Refining Co. 1 Marshall, SE SE NW 5-33s-3w, 9½ miles west of the Perth pool and 14½ miles north of the Oklahoma line, found oil showings in the Simpson sand topped at 4,386 ft (—3,157 ft.). In two drill-stem tests, one at 4,387-96 ft. and the other at 4,387-4,402 ft., heavily oil-cut mud was recovered. Hole will be carried to the Arbuckle.

Prospects of finding production in southwestern Nebraska are being encouraged by oil showings encountered by Ohio Oil Co. in its 1 M. E. Egging, NE corner 11-15n-49w, Cheyenne County. Dakota sand was topped at 4,362 ft., and cores at 4,550-70 ft. carried saturation. In a drill-stem test, oil was recovered but the amount was not reported. Casing has been ordered. The location is near the Colorado line. Elevation is 4,205 ft.

KANSAS WILDCAT FAILURES

Barton County: Republic Natural 1 Sette "A," NE NE SE 31-17s-13w, dry, TD 3,370 ft., Arbuckle 3,354 ft.

Graham County: Hanson 1 Deprad, NW NW NE 27-7s-22w, dry, TD 2,777 ft., Heebner 3,408 ft., Lansing-Kansas City 3,447 ft., Arbuckle 3,756 ft.

Rine et al 1 McClellan, NW NW NE 7-10s-21w, dry, TD 3,950 ft., Arbuckle 3,912 ft.

Armer et al 1 Noah, NE NE NW 21-10s-21w, dry, TD 3,842 ft., Heebner 3,417 ft., Lansing-Kansas City 3,459 ft., Arbuckle 3,792 ft.

Rice County: Aledo 1 Schmidt, CSL SW NE 35-18s-10w, dry, TD 3,400 ft., Heebner 2,814 ft., Lansing-Kansas City 2,957 ft.

Barbara Oil Co. 1 Wolfe, SW SW NE 2-19s-8w, dry, TD 3,490 ft., Lansing-Kansas City 2,878 ft., Simpson 3,384 ft., Arbuckle 3,443 ft.

Rooks County: Reasor 1 Howe, NW NW NW 1-6s-18w, dry, TD 3,450 ft., Topeka 2,790 ft., Heebner 2,995 ft., Lansing-Kansas City 3,024 ft., Arbuckle 3,422 ft.

Russell County: Fordee Rhoades 1 Smith, NE SE NE 1-15s-12w, dry, TD 3,335 ft., Heebner 2,837 ft., Douglas 2,875 ft., Lansing-Kansas City 2,943 ft., Arbuckle 3,310 ft.

SOUTHWEST TEXAS

New Gas Discovery Is Reported by The Texas Co.

CORPUS CHRISTI.—The Texas Co. 1 William M. Rice Institute is a new gas discovery from the Wilcox sands in Waller County. Drilled to a total depth of 12,561 ft., the hole was plugged back and is producing 3,950,000 cu. ft. of gas and 40 bbl. of condensate per day through perforations at 10,290-304 ft., with 1,100 psi. tubing pressure and 4,310 psi. shut-in pressure. This discovery is in the John M. Stephens Survey.

A new oil-pay sand for Alfred field, Jim Wells County, has been opened by Morris Cannan 1 O. S. Adams, flowing 55 bbl. of oil per day through a 9/64-in. choke, with tubing pressure of 525 psi., and casing presure of 790 psi. Total depth is 5,110 ft., with production through perforations at 4,575-81 ft.

Quintana Petroleum Corp. 1 J. H. Harvey, wildcat 3½ miles northeast of Gregory in San Patricio County, flowed gas-condensate on a new test through perforations at 9,978-84 ft., with shut-in pressure of 5,250 psi. Previous test at 9,346-61 ft. flowed 177 bbl. of oil through 5/32-in. choke with 680 psi. tubing pressure, then packer failed. New test flowed 175 bbl. per day through ⅛-in. choke with 650 psi. tubing pressure, gas-oil ratio 600, but water broke in the flow due to a faulty cement job. Operators then cemented a string of 5½-in. casing to 9,721 ft. inside 7-in. pipe to the top of the 5-in. liner, then cemented 7-in. and 5½-in. pipe and made a squeeze job at 10,058-60 ft. prior to the current testing.

H. R. Smith, Inc., Gulf Oil Corp., and Alaska Steamship Co. 1 Max Otto, a northeast extension to Weigang field in Atascosa County, gaged 91.37 bbl. of 24°-gravity oil per day through a 9/64-in. choke. Tubing pressure was 425 psi., with casing sealed. Production is through perforations at 3,872-75 ft. Gas-oil ratio 1,050.

Magnolia Petroleum Co. A-1 Drought, discovery well in Charmousca-Wilcox field, Duval County, has been recompleted in a shallower sand, through perforations at 5,953-74 ft., flowing 1,765,000 cu. ft. of gas and 8 bbl. of 55.8°-gravity condensate and 14 bbl. of salt water through 5/16-in. choke. Tubing pressure 746 psi., casing sealed, gas-condensate ratio 217,500. Originally this well was completed through perforations at 6,545-65 ft. for gas-condensate and tested light flow of oil.

There were 36 new locations reported this week for Districts 1 and 4, of which 17 are wildcat starts, 6 in Duval, 2 each in Starr, Webb, and Williamson, and 1 each in Aransas, Frio, Hidalgo, Jim Wells, and Travis counties. Two successful exploratory tests were completed, one each in Duval and Jim Wells counties, while seven wildcats were dry, two in Jim Hogg, and one each in Bexar, Gillespie, Jim Wells, Webb, and apata counties.

SOUTHWEST TEXAS (DISTRICTS 1 AND 4) SUCCESSFUL WILDCATS

Duval County: New oil pool, North Chiltipin—W. L. Goldston 2 Ed Canales, ½ mile northwest of Chiltipin field, in SA&MG Sur., A-529, top pay 4,148 ft., TD 4,706 ft., perf. 4,151-55 ft., IP 100 bbl. oil per day through ⅛-in. choke, TP 640 psi., CP 750 psi.

Jim Wells County: New oil pay, Alfred—Morris Cannan 1 O. S. Adams, in Wm. Adams Sur. 5, TD 5,110 ft., perf. 4,575-81 ft., IP 55 bbl. oil per day, TP 525 psi., CP 790 psi.

SOUTHWEST TEXAS (DISTRICTS 1 AND 4) WILDCAT FAILURES

Bexar County: Rollin V. Hill, Jr., 1 Casper Pollock, in M. Gortaris Sur. 7, dry, TD 1,921 ft.

Gillespie County: B. L. Raborn, Jr., 1 Herman Usener, in J. W. & R. Leavitt Sur. 68, dry, TD 635 ft.

Jim Hogg County: Amerada Pet. Corp. 3 A. A. Martinez, in Day Land & Cattle Co. Sur. 294, A-91, dry, TD 4,015 ft.

Hewit & Dougherty and Hobo Oil Co. 2 Joseph Gruey et al, in Noriacitas grant, ¼ mi. north of Hebbronville, dry, TD 4,513 ft.

Jim Wells County: Mudge Oil Co. 1 Hildegard Buegeler, Los Presenos de Arriba Sur., A-148, dry, TD 5,415 ft.

Webb County: O. W. Killam 2 Bruni Est., in Sur. 449, 8 mi. south of Bruni, dry, TD 4,600 ft.

Zapata County: Windsor Oil Co. 1 Filiberte Pena, in El Pedernal grant, dry, TD 5,516 ft.

SOUTH LOUISIANA

New Gas-Condensate Pool Opened Off Cameron Parish

NEW ORLEANS.—A new gas-condensate pool, approximately 10 miles offshore Cameron Parish, in Gulf of Mexico, has been opened by Stanolind Oil & Gas Co. 1 Louisiana State Lease 1133, Block 45, flowing 19 bbl of 51.5°-gravity condensate and 1,880,000 cu. ft. of gas per day with 3,000 psi. flowing pressure on the tubing. The well was drilled to 9,728 ft., but blew out of control after cementing 7-in. casing to 9,727 ft., and flowed gas, condensate, and salt water. After blowing several days, the hole was controlled and operators plugged back to sidetrack at 4,400 ft. Total depth of sidetracked hole is 8,814 ft., with perforations for completion at 8,738-48 ft.

State potential for Barnsdall Oil Co. 1 M. Jones, 3-6s-9w, wildcat discovery in the East Longville area of Beauregard Parish, has been reported. Drilled to a total depth of 8,355 ft., this well flowed 324 bbl. of 47.2°-gravity pipe-line oil per day through 10/64-in. choke, with tubing pressure 1,850 psi., and casing pressure 1,600 psi. Production is through perforations at 8,320-36 ft., with gas-oil ratio 1,652.

Callery & Hurt 1 Henry Goss, discovery oil well midway between Bayou Mallet and South Bayou Mallet production in Acadia Parish, in 13-7s-1e, has been completed for a potential test of 184 bbl. of oil per day through a 9/64-in. choke, gravity 36°, perforations 8,497-8,503 ft. Total depth 8,755 ft.

In Caillou Island field, Terrebonne Parish, The Texas Co. 92 State Lease 188, has been completed flowing 313 bbl. of oil per day through a 9/64-in. choke, 37.4° gravity. Total depth is 11,485 ft., and perforations for completion are from 11,252-82 ft.

Gulf Refining Co. 16-B J. G. Timolat et al, West Bay field, Plaquemines Parish, was drilled to a total depth of 10,689 ft., and completed through perforations at 8,916-32 ft., flowing an initial potential of 455 bbl. of oil per day through 5/32-in. choke, gravity 33.6°.

The 18 new locations for this week included 3 wildcat starts, 2 in Cameron and 1 in Beauregard parishes. One successful exploratory test opened an oil pool in Acadia Parish while four wildcats were dry, one each in Cameron, Jefferson, Plaquemines, and St. Mary parishes.

SOUTH LOUISIANA SUCCESSFUL WILDCAT

Acadia Parish: New oil pool—Callery & Hurt 1 Henry Goss, 13-7s-1e, midway between Bayou Mallet and South Bayou Mallet, TD 8,755 ft., top sand 8,497 ft., perf. 8,497-8,503 ft., IP 185

bbl. oil per day, 9/64-in., TP 1,675 psi., gravity 36°, no water.

SOUTH LOUISIANA WILDCAT FAILURES

Cameron Parish: Magnolia Pet. Co. 2 Abel West heirs, 27-14s-10w, dry, TD 11,896 ft.

Jefferson Parish: The California Co. 13 E. P. Brady Unit 4, in South Bayou de la Fleur, 6-16s-24e, dry, TD 10,733 ft.

Plaquemines Parish: Humble Oil & Refining Co. 1 Tiger Pass State Lse. 818, Acct. I, in Tiger Pass, dry, TD 11,405 ft.

St. Mary Parish: Humble Oil & Refining Co. 1 Frank Buttram et al, Twp. 15s-8e, dry, TD 13,010 ft.

ROCKY MOUNTAIN

Shows Reported in Tight Hole of Ohio in Nebraska

DENVER.—Ohio Oil Co. is now running casing at its important wildcat 1 M. E. Egging, NE NE NE 11-15n-49w in the Gurley area, Cheyenne County, Nebraska. The operator reports the well is now at 4,405 ft., total depth, and has made the well a tight hole. However, it is reliably reported that the well is now in Muddy sand, and the drill-stem tests have been made in this zone following shows of oil. Ohio and others are reported to be leasing in the area as a result of shows in this well.

This wildcat is located on the northeast side of the Denver basin, 10 miles northeast of the town of Sidney. There has been no previous drilling in this area of the basin. Ohio did extensive seismic work throughout the general area, southwestern Nebraska and northeastern Colorado prior to making this location. There is no oil production in this area of the basin, although Muddy sand produced in several fields along the eastern side of the basin in Wyoming and Colorado. Ohio reportedly has more than 170,000 acres of lands leased in this general area.

Apparently another failure has been drilled on the Dove Creek structure, Montezuma County, Colorado. Although saturation was logged in the Paradox at the H.E.R. Drilling Co. et al 1 Lane Coffee, C SE SE 34-39n-18w, 7 miles northeast of Western Natural Gas Co., Byrd-Frost et al discovery well on this structure, failed to show more than gas-cut mud on drill-stem test. Top of Paradox was found at 5,708 ft., and well was drilled to 6,031 ft., total depth, in salt. The well had a faint blow for 20 minutes on drill-stem test between 5,989-6,031 ft., and only 21 ft. of slightly gas-cut mud was recovered in 40 minutes. Recently Western Natural Gas et al abandoned an attempted expansion, southwest of the discovery well, after failing to obtain gas and condensate in the Paradox.

Shell Oil Co., Inc., has abandoned the deepest well ever drilled in Montana. The well is located on the Ash Creek structure on the northwest side of Powder River basin. It is 1 Crow Tribal NE NE NE 36-9s-37e, and went to 11,519 ft., total depth, with Cambrian topped at 11,191 ft. No shows were reported in any zone in the well; however, the operator plugged back to 4,230 ft. prior to abandoning. On drill-stem test at 4,120-4,230 ft. the well made 90 ft. of watery mud and 2,170 ft. of muddy water in 1 hour. Several other drill-stem tests were made in the Tensleep and Big Horn sections but only drilling mud was recovered.

Union Oil Co. has plugged its wildcat 1 Mackay NE SE SW 13-6s-17e, at Mackay Dome, Carbon County, Montana. The well was drilled to 3,737 ft., total depth, in the Lakota and found 40° dips in that zone. Union plans additional seismic work in this area and upon completion of this may drill another well. Some staining was logged between 3,502-95 ft., in basic Cretaceous sand, but on drill-stem test this zone made only a show of oil and gas with a slight amount of drilling mud.

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New locations.—There were 30 new locations in the Rocky Mountain states during the week, with 14 in Wyoming, 11 in Montana, 2 in Colorado, 2 in Utah, and 1 in western South Dakota. The South Dakota location is Pacific Western Oil Co.'s 1 Government, NW NW SW 10-11s-1e, on Wallace Dome, Fall River County. The well will test Minnelusa sands at around 3,800 ft. Location was announced by Pure Oil Co. for a deep wildcat at 1 Unit, SE NE NW 35-39n-89w, on the Badwater unit, western Natrona County, Wyoming. The well is located northwest of Pure's West Poison Spider, where production is found in Frontier sand at 14,000. The Badwater wildcat is expected to find Frontier below 10,000 ft.

WYOMING SUCCESSFUL WILDCAT

Pilot Butte, Fremont County: Superior Oil Co. 1 Sheldon-Dobler Community, CE½ NE NW 27-3n-1w(WRM), 3,600 ft TD, Frontier 2,348 ft, Muddy 3,533 ft.

WYOMING WILDCAT FAILURES

NW Manderson, Big Horn County: J. B. Wesnitzer 1 Spencer, SE SW SW 14-50n-93w, TD 744 ft, temp, abnd., Frontier 728 ft.

NW Sheldon Dome, Fremont County: Phillips-Kerr-McGee and Carter 1 Sheldon Dome, C NW SW 36-6n-3w (WRM) TD 5,169 ft., abnd., Muddy 1,938 ft., Cloverly 2,120 ft., Morrison 2,270 ft., Sundance 2,660 ft., Nugget 3,140 ft., Jelm 3,205 ft., Alcova 3,450 ft., Dinwoody-Phosphoria 4,650 ft., Tensleep 5,065 ft.

Manville, Niobrara County: Wilshire and Atlantic 1 Manville-State, C NW NW 16-33n-65w, TD 1,623 ft., abnd., Chugwater 910 ft., Minnekahta 950 ft., Opeche 970 ft., Minnelusa 1,010 ft., First Converse 1,036 ft., Second Converse 1,193 ft., Red Marker 1,313 ft., Leo 1,403 (?) ft.

Newcastle area, Sweetwater County: Parker & Simmons 3 Govt.-Wright, SW NW NW 10-44n-61w, TD 2,865 ft., abnd., Newcastle 2,835 ft.

COLORADO WILDCAT FAILURE

Buckhorn Creek, Larimer County: O. H. Maryatt 1 Rutledge, C SW SW 6-5n-69w, TD 698 ft., susp. indef., Muddy 549 (?) ft.

MISSISSIPPI

Discovery Well Completed For New Ellislie Field

JACKSON.—Sohio Petroleum Co., Hunter Jones, and Kemp Drilling Co. 1 George Armstrong, 36-5n-3w, has been completed as the discovery well for Ellislie field, Adams County. Drilled to a total depth of 6,520 ft., this well was completed through perforations at 6,467-71 ft., for an initial potential of 360 bbl. of 38°-gravity oil, flowing through a 12/64-in. choke, tubing pressure 665 psi.

Hodge-Gilster & Kemp 1 Lehman Brothers, SE NW 28-7n-2e, in Oldenburg field, Franklin County, recovered 1½ ft. of saturated Wilcox sand in core from 5,940-47 ft. On a 6-minute drill-stem test with packer set at 5,940 ft., using ¼-in. top and ⅜-in. chokes, recovered 1,620 ft. of oil, 180 ft. of salt water and mud, and 60 ft. of sand. Operators are continuing to test.

The California Co. 1 Harry L. Rankin, Jr., 19-2n-14e, in Hub field, Marion County, has been completed flowing 74 bbl. of 43.2°-gravity oil through a ⅛-in. choke. Production is from open hole 9,128-31 ft. Total depth is 9,131 ft.

In LaGrange field, Adams County, Kingwood Oil Co. 2 Maud Stanton, 66-7n-2w, was drilled to a total depth of 6,130 ft., and completed through 13/64-in. choke flowing 150 bbl. of oil per day, tubing pressure 300 psi.

There were four new wildcat starts reported for Mississippi this week, two in Sharkey, and one each in Issaquena and Jefferson counties. One development location was shown for Yellow Creek field in Wayne County. One successful exploratory test opened a new field in Adams County, while one wildcat was dry in Jones County.

MISSISSIPPI SUCCESSFUL WILDCAT

Adams County: New oil pool, Ellislie—Sohio Pet. Co., Hunter Jones, and Kemp Drilling Co. 1 George Armstrong, 36-5n-3w, TD 6,520 ft., perf. 6,467-71 ft., IP 360 bbl. of 38°-gravity oil through 12/64-in. choke, TP 665 psi.

MISSISSIPPI WILDCAT FAILURE

Jones County: Forest-Honolulu 1 Lindsey, SW NW 28-9n-11w, dry, TD 6,676 ft., top Eutaw 6,135 ft., Tuscaloosa 6,627 ft.

TEXAS GULF COAST

Five New Discoveries Reported During the Week

HOUSTON.—A new oil discovery in the Hicksbaugh area of Tyler County has been completed by Humble Oil & Refining Co. B-1 William M. Rice Institute, and on potential gage flowed 51.15 bbl. of 39.6°-gravity oil per day through a 3/16-in. choke. Drilled to a total depth of 10,000 ft., and plugged back to 8,516 ft., perforations for completion were made from 8,480-83 ft. This well is located in the T.&N.O. Survey, Section 5.

In Brooks County, L. M. Lockhart 1 Adolfo Garcia, wildcat, has been completed for a new oil discovery, flowing 150 bbl. of oil per day through a ⅛-in. choke. Production is through perforations at 3,855 ft. level. Total depth is 6,615 ft. This well is located 11⅓ miles north of the East Alta Mesa gas-condensate field, and approximately 1 mile northeast of the old Alta Mesa field. Location for 2 Adolfo Garcia has been made 1,320 ft. north of the discovery well.

A new gas-condensate field, approximately 2½ miles northwest from Wharton in Wharton County, is being opened by Gulf Oil Corp. 1 J. H. H. Dennis, which is flowing gas and water-white condensate through perforations from 5,274-80 ft. Total depth is 6,201 ft., with 5½-in. casing on bottom. This wildcat is located in the Robert Kuykendall League.

Superior Oil Co. 1 Mrs. Celia Maley et al, a new gas-condensate discovery, in northwestern Bee County, in A.B.&M. Survey 3, gaged 96 bbl. of 59.2°-gravity condensate per day through a 7/32-in. choke and 1,911,000 cu. ft. of gas, through perforations at 8,100-12 ft. Tubing pressure 1,950 psi., casing sealed.

A new gas discovery, Caroline Hunt Trust 1 J. S. Hall, in Live Oak County, in BS&F Survey 185, 7½ miles south of George West townsite, has been completed. Drilled to a total depth of 5,272 ft., completion was made through perforations from 4,318-26 ft., flowing 700,000 cu. ft. of gas per day through ⅞-in. choke. Well has been shut in, shut-in pressure 1,500 psi. on tubing and 1,525 psi. on casing.

The 41 locations reported for Districts 2 and 3 included 13 wildcat starts, 3 in Refugio, 2 each in Jackson and Lavaca, and 1 each in Brazoria, Calhoun, Chambers, Fort Bend, Hardin, Victoria, and Wharton counties. Five successful exploratory wells were completed, one each in Bee, Fort Bend, Live Oak, Tyler, and Waller counties, while six wildcats were dry, one each in Brazoria, Goliad, Madison, Matagorda, Montgomery, and Trinity counties.

TEXAS GULF COAST (DISTRICTS 2 AND 3) SUCCESSFUL WILDCATS

Bee County: Gas-condensate discovery—Superior Oil Co. 1 Mrs. Celia Maley et al, AB&M Sur. 3, A-79, 2 miles west of Yoward field, top pay 8,100 ft., TD 8,307 ft., perf. 8,100-12 ft., IP 96 bbl., condensate per day through 7/32-in. choke, TP 1,950 psi.

Fort Bend County: New pay, Big Creek, South Flank, The Texas Co. C-1 A. P. George, B. Wickson Sur., top sand 3,720 ft., TD 4,150 ft., perf. 3,720-30 ft., 160 bbl. oil per day through 14/64-in. choke, TP 300 psi.

Live Oak County: New gas pool—Caroline Hunt Trust Est. 1 J. S. Hall, BS&F Sur., A-96, 7½ miles south of George West, TD 5,272 ft., perf. 4,318-26 ft., 700,000 cu. ft. of gas per day through ⅞-in. choke, gas-condensate ratio 51,211, TP 1,126 psi. shut-in pressure, 2,404 psi., gravity 56.8°.

Tyler County: New oil discovery—Hicksbaugh, Humble Oil & Refining Co. B-1 William Rice Institute, T&NO 5 Sur., A-646, 4½ miles southeast of Warren townsite, top sand 8,480 ft., TD 10,500 ft., 51 bbl. of oil per day through ⅝-in. choke, GOR 1,209, TP 200 psi., gravity 39.6°.

Waller County: Gas-condensate pool discovery, The Texas Co. 1 William M. Rice Institute, John M. Stephens Sur., 5½ miles west of Magnolia townsite, top sand 10,290 ft., TD 12,561 ft., perf. 10,290-304 ft., 40 bbl. condensate, open flow, SIP 4,310 psi.

TEXAS GULF COAST (DISTRICTS 2 AND 3) WILDCAT FAILURES

Brazoria County: J. S. Abercrombie C-1 R. D. MacDonald, Jno. Cummings Sur., Old Ocean area, dry, TD 11,525 ft.

Goliad County: Continental Oil Co. 1 C. C. Ramsey, M. J. Ybarvo Sur., A-51, 15 miles northwest of Goliad, dry, TD 5,515 ft.

Madison County: M. W. Shriver & Leonard Culbertson 1 J. P. Andrews Sur., 6 miles southwest of Elwood, dry, TD 8,900 ft.

Matagorda County: Placid Oil Co. 1 F. F. Insall, John Partin Sur., A-59, 4 miles east of Midfields, dry, TD 10,220 ft.

Montgomery County: W. F. Newton et al 1 Mary F. Wyman, P. H. Herndon Sur., 3½ miles northwest of Conroe, dry, TD 4,684 ft.

Trinity County: Grier-Jackson, Inc., 1 Houston County Timber Co., A. Henry Sur., A-822, 9½ miles northwest of Apple Springs, dry, TD 7,659 ft.

APPALACHIAN FIELD

New Deep Test Planned In West Virginia

PITTSBURGH.—A new location for a deep wildcat test has been announced in Dry Fork district, Tucker County, West Virginia, by Cumberland & Allegheny Gas Co. 1A-425 Jason Harman. One has also been made in Steele district, Wood County, by Limestone Gas Co. 1 L. W. Pfalsgraf, elevation 985.20 ft., on the Belleville Quadrangle, 1.5 miles south of Latitude 39 degrees, 05 minutes and 4.4 miles west of Longitude 81 degrees, 30 minutes. In Loudon district, Kanawha County, Owens, Libbey-Owens 20-769 Great Kanawha Petroleum, Coal & Lumber Co. reported gas in the white Medina sand at a depth of 6,073-79 ft. In Triadelphia district, Logan County, United Producing Co. 77-1569 W. M. Ritter Lumber Co. tested 2,100,000 cu. ft. of gas in the Berea sand. In Nicholas County, Columbian Carbon Co. 1-1119 E. M. Johnson was brought in at the rate of 1,917,000 cu. ft. of gas in the Big lime, and in Trap Hill district, Raleigh County, this company's B3-1110 C. C. Dickinson tested 2,308,000 cu. ft. of gas in the Ravencliff, Maxon, and Big lime formations.

In Unity Township, Westmoreland County, Pennsylvania, Peoples Natural Gas Co. 1-3830 William Piper is shut down at a depth of 8,229 ft.; also, Camilla Giffin 4-3814, in Derry Township, at a depth of 8,674 ft.

There were 19 new locations reported in West Virginia, and 5 in southwest Pennsylvania.

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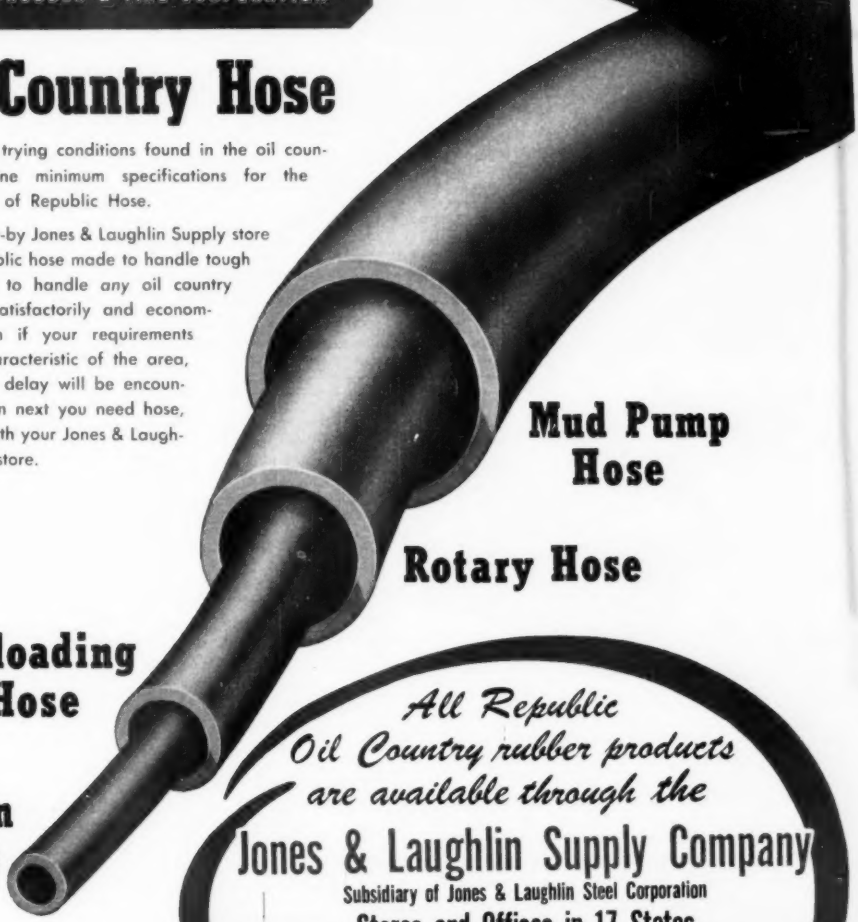

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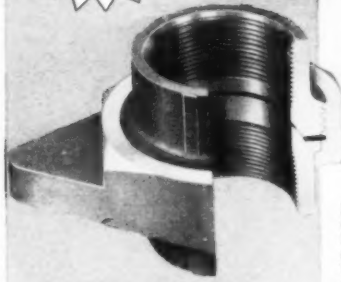

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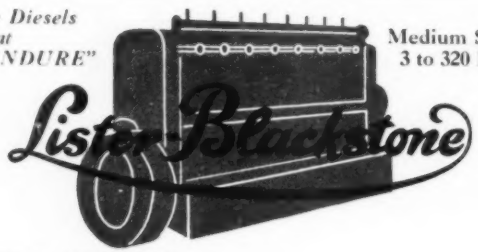

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EASTERN TEXAS

Humble Confirms New Gossett Field

DALLAS.—Humble Oil & Refining Co.'s second test in Gossett (Rodessa) field of Kaufman County, opened last year, was showing for confirmation production. The new well, Humble 1-B Tuggle, Edward Fitzgerald Survey, 1,914 ft. southwest of the discovery, swabbed 40 bbl. of net oil in 10 hours after acidizing with 1,000 gal. to 6,153 ft. The amount of water swabbed was not reported. Operators planned to retreat with 5,000 gal.

In Longwood field, Harrison County, Placid Oil Co. 1 Winston, Perry Survey, recovered oil and wash water after a 1,000-gal. acid treatment of the Pettit limestone at 5,626-44 ft. Previous to the treatment, salt water was recovered in swabbing perforations at 5,652-62 ft.

In eastern Shelby County, Barnsdall Oil Co. 1 West Pickering, Simpson Survey, recovered 16 ft. in coring from 3,336-52 ft., being 7 ft. of Eagleford chalk and 9 ft. of chalky lime with gas odor and slightly salty taste.

Cities Service Oil Co. 1 Balfour, S. M. Grace Survey, south offset to the discovery of Red Springs (Rodessa) field of northern Smith County, was drilling ahead below 4,436 ft.

Byars & Peveto 1 Tully, Paluxy prospect in southern Franklin County, 10 miles north of Mount Vernon, was to be plugged back by states, in an effort to shut off water. The well has been producing from 350-400 bbl. of fluid a day from 4,405-36 ft., averaging about 10 per cent oil.

Byars & Peveto 1 M. Sealy, I. Handlin Survey, deep test in Weiland field of Hunt County, was drilling below 4,123 ft. in Georgetown limestone.

In Wood County, 2 miles northwest of Mineola, Bobby Manziel 1 Maud Thompson, sub-Clarksville discovery, was making a better showing since early swabbing tests. With pumps installed, it was said to be tanking more than 200 bbl. of oil a day, with no water.

In southeast Harrison County, Mudge Oil Co. 1 J. B. and J. D. Furrh, J. B. Stroud Survey, extended Travis Peak oil production southwest of Waskom field. The well made a daily flowing potential of 449.6 bbl. of 42°-gravity oil, from perforations at 6,214-38 ft. The flow was through ½-in. choke, under pressure of 700 psi. on tubing and 1,800 psi. on casing. Gas-oil ratio was 510 cu. ft. The well was drilled to 6,363 ft. and 5½-in. casing set on bottom. A drill-stem test from 6,210-40 ft. had good oil recovery, while a test from 6,266-6,363 ft. produced salt water. Location of the new well is about midway between Elysian fields and Waskom townsite. Operators skidded rig 2,400 ft. to the northwest for an offset test on the R. J. Wilburns heirs' land, Benjamin F. Hooper Survey.

EAST TEXAS (DISTRICTS 5, 6, and 6-P) WILDCAT FAILURES

Bowie County: Gulf Oil Corp. 1 John Veach, John McFarland Sur., A-384, 4 mi. SE Maud, dry, Td 10,165 ft., Pettit 6,382 ft., Travis Peak 6,493 ft., by electric log; sample tops: Woodbine 3,315 ft., Goodland 3,945 ft., Paluxy 4,086 ft., Cotton Valley 7,595 ft., Buckner 9,160 ft., Smackover 9,614 ft., Eagle Mills 10,095 ft., elev. 242 ft.

Cherokee County: Cargo Drilling Co. 1 O. M. Walker, J. M. Musquez Sur., 10 mi. E Rusk, dry, TD 4,720 ft., Woodbine 4,222 ft., Georgetown 4,680 ft., by samples.

Hunt County: Oscar Kemp 1 Brooks Cole, J. A. Billingsly Sur., 3 mi. E. Merit, dry, TD 3,534 ft., Woodbine 1,740 ft., Georgetown 2,480 ft., Goodland 3,035 ft., Paluxy 3,072 ft.

Navarro County: N. C. Walker 1 Carter,

T. J. Chambers 8-League grant, 4 mi. SE Rice, dry, TD 695 ft.

Sabine County: S. J. Carnes 1 Pickering, J. F. Ballinover Sur., 3 mi. NE Geneva, dry, TD 6,500 ft., Navarro chalk 3,210 ft., Saratoga 3,327 ft., Annona 3,512 ft., Blossom 3,850 ft., Austin 4,262-4,690 ft., Comanche 4,755 ft., by samples, elev. 378 ft.

Wood County: Ace Oil Co. 1 C. B. Winchester, J. S. Westbrook Sur., 2½ mi. SE Winnsboro, dry, TD 5,102 ft., Woodbine 5,000 ft., by samples.

Delta Drilling Co. 1 H. W. Swindle, Hayden Arnold Sur., between Yantis and Como fields, dry, TD 4,825 ft.

OKLAHOMA

New Wells Extend Pay In South Palacine Pool

THREE additional wells for the recently opened South Palacine Pennsylvanian sand pool in Stephens County have found the pay, extending the productive area to the west, southwest and south. Amerada Petroleum Corp. 2 Yates, SW SW SE 16-2s-6w, a 10-acre location west of the same operator's 1 Yates, completed last week as the west offset to the discovery well and the second producer for the pool, recovered 1,620 ft. of free oil with 300 ft. of oil-cut mud and 510 ft. of water in a drill-stem test of sand at 2,460-2,550 ft. It has been deepened to 2,580 ft., where another test is being made.

Sunray Oil Corp. 1 Nichols, NE NW NE 21-2s-6w, southwest diagonal offset to the discovery well and a location south of Amerada's first well, recovered 660 ft. of clean oil and 150 ft. of oil-cut mud in a test of sand at 2,590-92 ft., and 420 ft. of clean oil and 30 ft. of oil-cut mud in a previous test at 2,543-60 ft. Additional sand was topped at 2,635 ft. and with hole deepened to 2,700 ft., 7-in. casing has been run to 2,548 ft.

Lario Oil & Gas Co. 1 Null, NW NE NE 21-2s-6w, south offset to the discovery well, found saturation in sand at 2,585-2,600 ft., and is preparing to make drill-stem test. The discovery well, J. E. Jackson 1 Hughes, was completed April 19 as a 52-bbl. pumper with sand at 2,686-94 ft.

Smiley & Little and M. T. Myers 1 Trudgeon, SW SW SW 14-4n-1w, a wildcat north of the Pauls Valley field in Garvin County, recovered 150 ft. of oil and 60 ft. of oil-cut mud in a drill-stem test of a saturated sand at 4,428-37 ft. Hole is being deepened to its contract depth of 4,800 ft. for a test of the Bromide sand.

Judging from drill-stem tests, Sinclair Prairie Oil Co. has a good well in its 1 W. K. Donnell, C SW SW 21-4n-3w, diagonal northeast offset to the discovery well of the new Southeast Lindsay pool, Garvin County. It apparently establishes a trend which may tie in with the Southeast New Hope field to the northeast. Successive tests were made at 7,140-70 ft., 7,195-7,232 ft., and 7,265-7,302 ft. In the first, the well started flowing 41.5° oil in 22 minutes after tool was opened, made 60 bbl. in 90 minutes, and an additional 40 bbl. while tool was being pulled. A total of 2,060 ft. of oil was recovered in the pipe. Gas, which showed in 4 minutes, was estimated good for 1,100,000 cu. ft. per day. In the second test 720 ft. of 38° oil and 270 ft. of oil-cut mud was recovered. Gas flow was estimated at 878,000 cu. ft. per day, and 30 ft. of 58° distillate and 250 ft. of oil and gas-cut mud was recovered. The discovery well, Max Pray and Elisha Walker, Jr., 1 Pratt, completed early this year, flowed 130 bbl. per day through perforations in the sand (Deese series) at 7,290-7,315 ft.

OKLAHOMA SUCCESSFUL WILDCATS

Cotton County: Ross 2 Hall "A," NW NW NW 16-5s-12w, pumped 70 bbl. of oil per day from sand at 1,766-72 ft., TD 1,774 ft.

Creek County: New pay in Cushing—LeBow 3 Fulsom, N½ N½ SE 6-17n-7e, 7,000,000 cu. ft. of gas from reworked Simpson at 2,855-59 ft., TD.

Hughes County: Delaney 1 Long heirs, NE NE NE 14-8n-9e, gaged 7,200,000 cu. ft. of gas, open tubing, from limy sand and sandy shale at 3,131-46 ft., TD.

Kingfisher County: Superior 48-16 Kremke, SE SE SW 16-17n-7w, flowed 8 bbl. of 44.6°-gravity oil per day from Simpson dolomite at 8,569-8,600 ft.; Oswego 6,686 ft., Chester 7,278 ft., solid Mississippian 7,527 ft., Woodford 8,033 ft., Misener 8,068 ft., dolomite 8,100 ft., Checkerboard 8,208 ft., Sylvan 8,382 ft., second Wilcox 8,768 ft., TD 8,863 ft.

OKLAHOMA WILDCAT FAILURES

Cotton County: Hutcheson 2 Whitehead, SW SW SW 28-3s-12w, dry, TD 1,816 ft.

Hutcheson 2 Adams, SW SE SE 29-3s-12w, dry, TD 1,816 ft.

Wilcox 1 Nolan, SW SW SW 11-4s-12w, dry, TD 2,004 ft.

Creek County: Brander et al 1 Sorenson, NW NW NE 2-18n-10e, dry, TD 1,619 ft., Perryman 1,593 ft.

Hughes County: Crawford 1 Essley, NW NW NE 34-7n-5e, dry, TD 4,345 ft.

Kay County: Siler 1-A Burr, NW NW SE 19-25n-1e, dry, TD 2,601 ft., lime 1,585-1,600 ft. and 1,853-82 ft., Hoover sand 2,035-73 ft., Oread 2,175 ft., Endicott sand 2,275 ft., lime 2,388 ft., Tonkawa sand 2,570 ft.

Lincoln County: Slagter 1 Adams, SE SW SW 10-13n-3e, dry, TD 5,335 ft., Checkerboard 3,498 ft., Oswego 4,150 ft., upper Prue 4,170 ft., lower Prue 4,214 ft., Verdigris 4,312 ft., Woodford 4,950 ft., Hunton 5,020 ft., Sylvan 5,055 ft., Viola 5,155 ft., first Wilcox 5,242 ft., second Wilcox 5,304 ft.

Kemp 1 Robison, NW NW NW 32-17n-6e, dry, TD 3,870 ft., Hogshooter 1,974 ft.,

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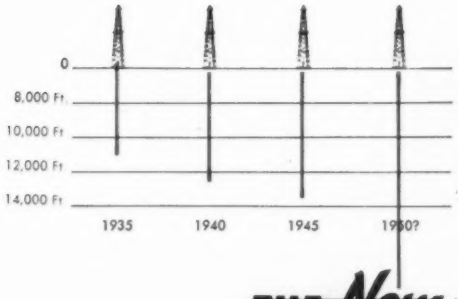

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Murray County: Graham 1 Strehlow, C NW SW 23-1n-1w, dry, TD 1,866 ft., sandy lime 1,412-20 ft., lime with sandy streaks 1,498-1,500 ft.

Pottawatomie County: Sterling 1 Youngblood, NW NW NW 12-11n-4e, dry, TD 4,978 ft., Hogshooter 2,780 ft., Layton 2,825 ft., Checkerboard 3,125 ft., Skinner 4,253 ft., upper Earlsboro 4,438 ft., lower Earlsboro 4,455 ft., Inola 4,535 ft., lime 4,672 ft., unconformity sand 4,777 ft., basal Pennsylvanian - Mississippi lime 4,860 ft.

Seminole County: Kirkpatrick 1 Archer, NW NW SW 8-6n-6e, dry, TD 3,200 ft., Belle City 668 ft., basal Wewoka 1,996 ft., Calvin 2,104 ft., coal 2,349 ft., Senora lime 2,412 ft., lime 2,503 ft., Red Fork 2,717 ft., lime 2,832 ft.

Gulf 1 McClanahan, SE SW NW 27-9n-8e, dry, TD 4,421 ft.

ILLINOIS

White County Discovery Pumps 450 Bbl. Per Day

MATTOON.—Opening of new production about a mile east of present limits of the Concord Central pool in White County has been established by completion of an exceptionally good well by George & Wrather and Barclay Oil Co. and associates in their 1 Garrison, NE NW NE 3-7s-10e. On potential tests, the well pumped 450 bbl. of oil natural per day. Production is from Waltersburg sand at 2,154-64 ft.

Another new pool opener in Hamilton County also looks like a good well. It is Illinois-Mid Continent Co. and Aurora Gasoline Co. 1 A. M. Thomas, SW SE SW 12-4s-7e, a mile northeast of production in the Bungay Consolidated area. Testing the Aux Vases at 3,338-45 ft., it swabbed 240 bbl. of oil natural. Further testing and completion of the well has been delayed by loss of the swab in the hole.

First Cypress sand production for the Fairfield pool in Wayne County is indicated by results of a drill-stem test of this zone in Stewart Oil Co. 1 Boswell, NW NW NW 20-2s-8e, in which 600 ft. of clean oil was recovered. Saturation in sand was at 2,952-67 ft. Hole is being deepened at least to the Aux Vases, the present producing horizon of this area.

The old Ava-Campbell gas area in Jackson County has been brought to life again by the completion of a small gasser by Cochran Brothers in their 1 Reickenberg, NE SW NE 11-7s-4w. The well is estimated good for 100,000 cu. ft. per day from the Tar Springs sand at 517-39 ft. (total depth 563 ft.). The area has been inactive since 1934.

Dirickson-Talbot and associates 1 K. M. Snider, SE NW NW 35-2n-1w, Trenton sand test on the west side of the north end of the Centralia field, Clinton County, has been completed on the pump making 72 bbl. of oil per day after a 3,000-gal. acid treatment. Total depth is 4,053 ft. with the pay at 4,008-30 ft.

C. M. Hickman has completed his 1 L. Brinkerhoff, NW NW NE 10-13n-13w, Edgar County, pumping 37 bbl. of oil per day from shallow Pennsylvanian sand at 442-67 ft. The well is a mile south of C. M. Faulkner 1 Stoneburner, SW SW NE 3-13n-13w, completed in 1948 as the discovery well in the same sand at 424-30 ft., and until now the sole producer in the area. In the meantime, James Ruston 1 Hukill, SE SE SW 3-13n-13w, a half mile south and a little west of the discovery well, is bailing 25 bbl. of oil natural from the same sand at 415-35 ft. The latter is a 10-acre location west of C. M. Faulkner 2 Stoneburner, drilled in 1948 as the only other test in the area, which failed to make a well in the sand.

ILLINOIS SUCCESSFUL WILDCATS

Clinton County: Dirickson & Talbot 1 K. M. Snider, SE NW NW 35-2n-1w, IP 72 bbl., Trenton 4,008-30 ft., TD 4,053 ft.

Edgar County: C. M. Hickman 1 L. Brinkerhoff, NW NE NE 10-13n-13w, IP 37 bbl., Pennsylvanian 442-67 ft., TD 467 ft.

Jackson County: Cochran Brothers 1 Reickenberg, SW SW NE 11-7s-4w, IP 100,000 cu. ft. of gas, Tar Springs 517-39 ft., TD 563 ft.

Marion County: Winn & Beck 1 Cheeley, NE NE SW 3-2n-4e, IP 25 bbl., McClosky 2,738-48 ft., TD 2,807 ft.

White County: George & Wrather et al 1 Henry Garrison, NE NW NE 3-7s-10e, IP 450 bbl., Waltersburg 2,154-64 ft., TD 2,164 ft.

ILLINOIS WILDCAT FAILURES

Clinton County: Ashland Oil & Refining Co. 1 E. Moulton, NE NE SE 34-3n-1w, dry, TD 4,050 ft.

Cumberland County: Shaffer & Callahan 1 Reisner, SW SW SW 36-9n-9e, dry, TD 2,754 ft.

Edgar County: Gopher Drilling Co. 1 W. M. Roll, SE NE SE 18-14n-3w, dry, TD 890 ft.

Edwards County: Fred Noah & Sons 1 Tanquary, SW SE SE 27-1n-10e, dry, TD 3,350 ft.

Macoupin County: Edgar White 1 E. R. Smith, NW NW NE 13-9n-7w, dry, TD 587 ft.

Macon County: Tuley & Carter 1 Brighton, NW NE NE 4-18n-4e, dry, TD 2,200 ft.

Madison County: W. R. Murphy 1 M.

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Marion County: H. Luttrell 3 Howell, SE NW SW 20-4n-3e, dry, TD 2,000 ft.

Montgomery County: A. E. DeFratis 3 Nieman, SW NE NE 29-8n-5w, dry, TD 640 ft.

Stewart Oil Co. 1 H. L. House, SE NE SE 29-10n-3w, dry, TD 1,005 ft.

Richland County: John W. Rudy 1 B. Fiscus, NW NW SE 15-2n-14w, dry, TD 3,101 ft.

Dean Shendall 1 C. Schonert, NW SW NE 16-3n-10e, dry, TD 3,127 ft.

Wayne County: Pure Oil Co. 1-A Scott, NW SE SE 32-2n-9e, dry, TD 3,325 ft.

N. CENTRAL TEXAS

Caddo Flows Oil in Test In Southwest Wise County

WICHITA FALLS.—In southwestern Wise County, about 5 miles southwest of the town of Cottondale, Signal Oil & Gas Co. and Loffland Brothers 2 Daly Unit 2, J. F. Williamson Survey, reported flowing oil from the Caddo. Top of the Caddo was 3,791 ft., with saturation drilled from 3,874-82 ft. Operations were then shut down due to high water. When the well was opened this week to run casing, it flowed oil at the rate of 20 bbl. an hour, and continued flowing until casing was cemented. Location is ¼ mile northwest of the same operators' 1 Daly, small gas-distillate discovery in the Ellenburger.

James F. Breuil 1 R. L. Morris, J. W. McClain Survey, ½-mile west outpost test to Chico field, topped the Caddo at 5,126 ft., and was drilling below 5,237 ft.

Nolan County.—Water was reported shut off at Iowa-Payne Oil Co. 1 N. L. McLeod, Strawn discovery southwest of Trent. Oil was said to be increasing while cleaning out from 5,403-47 ft., plugged-back total depth, from 5,735 ft.

Four miles southeast of Sweetwater, G. H. Broeie and Hunt Oil Co. 1 J. P. Aycock, 58-21-T&P, was producing 15 bbl. of 45°-gravity oil a day, plus 135 bbl. of salt water. Producing zone is the Ellenburger at 6,150-66 ft.

Sun Oil Co. 1 Mary S. B. Cook, 29-X-T&P, Ellenburger wildcat 11 miles southwest of Sweetwater, was drilling below 5,700 ft.

Drilling was under way at a new Cisco exploration 4 miles south of Merkel. The 3,200-ft. rotary project is Saxon Exploration Co. 1 W. B. Hill, located 1,000 ft. from north and 1,650 ft. from east lines of Subdivision 16, League 146, Grimes County School Lands.

Jack County.—Two miles west of Chico field, C. G. Glasscock and Pontiac Refining Co. 1 R. L. Morris made completion potential of 480 bbl. of oil in 24 hours, flowing through ¾-in. choke, from perforations at 5,413-26 ft. Completion had been delayed by high gas-oil ratios. The same operators' 2 Morris, northwest offset to the discovery, was drilling ahead below 2,487 ft.

In Post Oak Strawn field, Mid-Continent Petroleum Corp. 3 Killen, B. Lewis Survey, drilled Caddo conglomerate with oil shows from 5,360-62 ft., and prepared to core ahead. Location is a south offset to the Strawn discovery of the field.

One mile southeast of the field's present limits, Mid-Continent 1 Campsey, M. W. Thompson Survey, was coring below 6,300 ft. in the Ellenburger. Recovery was not reported.

Throckmorton County.—Cities Service Oil Co. and Sinclair Prairie Oil Co. 1-99 SMS Ranch, Block 99, BBB&C Survey, 12 miles northwest of Throckmorton, recovered 40 ft. of mud on a 30-minute drill-stem test of the Mississippian from 5,245-65 ft. It was drilling ahead below 5,446 ft.

Humble Oil & Refining Co.'s 1 Sanders, Block 2, W. S. Riddle Survey, was drilling below 4,257 ft. in lime after recovering 7 ft. of slightly gas-cut drilling mud on a 1-hour drill-stem test at 4,164-83 ft.

NORTH CENTRAL TEXAS (DISTRICTS 9 AND 7-B) SUCCESSFUL WILDCATS

Archer County: W. J. and J. J. Moran 2 W. R. Hammond, H. Corzine Sur., A-56, 4 mi. SW Scotland, flowed 84 bbl. 42°-gravity oil in 6 hr., Strawn sand 3,855-57 ft., TD, ¼-in. tubing choke, GOR 550 cu. ft., TP 65 psi., CP 400 psi.

Fisher County: Texas Pacific Coal & Oil Co. 1 A. E. Pardue, SW SW SE 199-1-H&TC, 4 mi. NW Hamlin, originally drilled dry to 3,298 ft., new TD 6,100 ft., dual completion; perforated Swastika 3,772-80 ft., flowed 127 bbl. 39.9°-gravity oil in 24 hr., 20/64-in. choke, CP 40 psi., tubing packed off; perforated Ellenburger 5,948-84 ft., flowed 78½ bbl. 42°-gravity oil in 24 hr., 16/64-in. choke, TP 50 psi., casing packed off, top Swastika 3,772 ft., Ellenburger 5,950 ft., elev. 1,823 ft.

Texas Pacific Coal & Oil Co. 1 Port H. Williams, 200-1-H&TC, 5½ mi. NW Hamlin, flowed 185 bbl. 40°-gravity oil a day, 14/64-in. choke, Swastika 3,776-82 ft., TP 275 psi., CP 400 psi., GOR 458 cu. ft., TD 3,825 ft., elev. 1,834 ft.

Wise County: R. B. Thrift 1 C. A. Laurence, J. B. Patterson Sur., A-953, 6 mi. SW Chico, flowed 3,000,000 cu. ft. gas in 8 hr., 3/8-in. top choke, TP 1,000 psi., top Caddo 5,060 ft., perf. 5,396-5,404, 5,477-5,504 ft., 2,000 gal. acid each set.

NORTH CENTRAL TEXAS (DISTRICTS 9 AND 7B) WILDCAT FAILURES

Archer County: Camation Petroleum Co. 1 J. D. Carpenter, Lot 89, Blk. 4, Clark & Plumb Subd., 4½ mi. SE Archer City, dry, TD 4,003 ft., oil shows 3,672, 3,884 ft.

Dub Wood Drilling Co. 1 R. M. Harmel, Blk. 29, Meade Pasture Subd., 5 mi. NE Megargel, dry, TD 1,961 ft.

Baylor County: Woods Drilling Co. 1 W. H. Portwood, W. R. Dickerson Sur., 184, 6 mi. E Bomarton, dry, TD 5,828 ft., Caddo 5,075 ft., had light oil and gas shows.

Brown County: Wamplin Bros. 1 N. D. Newton, Blk. 7, John Sanders Sur., 3 mi. SW Crosscutt, dry, TD 2,434 ft.

Callahan County: T. E. Castle 1 Mrs. L. Bryant, Sec. 65, BBB&C Sur., ½ mi. S Clyde, dry, TD 2,178 ft., Dotham sand 1,354 ft., Flippen 1,630 ft., oil show 1,755 ft.

Castle & Winfrey 1 Hoyt Rogers, Sec. 64, BBB&C Sur., 2 mi. S Clyde, dry, TD 2,208 ft.

West Bros. 1 Heyer estate, Sec. 20, B.O.A. Land Sur., 6 mi. S Putnam, dry, TD 507 ft.

Clay County: Bridwell Oil Co. 1 Saner estate "C," J. Massie Sur., 4 mi. S Thornberry, dry, TD 1,700 ft.

Coleman County: United North & South Development Co. 1-A R. R. Browning, Sec. 6, T&NO Sur., 2½ mi. NE Glen Cove, dry, TD 2,063 ft.

Cooke County: N. L. Barrett 1 O. G. Rennels, John Barnett Sur., 2 mi. NE Galewood field, dry, TD 1,130 ft. in shale.

Eastland County: Del-Lake Oil Co. 1 Bible, J. F. Tapp Sur., 8 mi. SW Carbon, dry, TD 3,597 ft., Marble Falls 3,030 ft., Ellenburger 3,541 ft. had light oil show.

Erath County: American Liberty Oil Co. 1 D. A. Fellers, J. Taylor Sur., 3¼ mi. NW Hico, dry, TD 4,890 ft.

Fisher County: Deep Rock Oil Corp. 1 W. S. Etheredge, SE SE NW 73-3-H&TC, 9½ mi. W Roby, dry, TD 7,048 ft., Valera 2,840 ft., Coleman Junction 3,320 ft., Dotham 3,760 ft., Noodle Creek 3,885 ft., Ellenburger 4,115 ft.

Jack County: Sorrells Oil Co. 1 A. D. Campsey, Lot 31, Wood CSL, A-875, 9 mi. E. Antelope, dry, TD 6,485 ft., Caddo 5,508 ft., Marble Falls 5,864 ft., flowed 73 bbl. oil in 3 hr., then flowed by heads 3 hr. and died, hole caved in.

Jones County: A. G. Hill and Walter Duncan 1 Agatha Manfield, B. Trevino Sur. 190, 4 mi. NE Hawley, dry, TD 2,380 ft.

Kingery, Patterson & Witherspoon 1 Earl Wilson, Sec. 7, O.A.L. Sur., 8 mi. E Anson, dry, TD 3,605 ft., King 2,319 ft., Swastika 2,450 ft., Gunsight 2,585 ft., Canyon 2,911 ft., elev. 1,653 ft.

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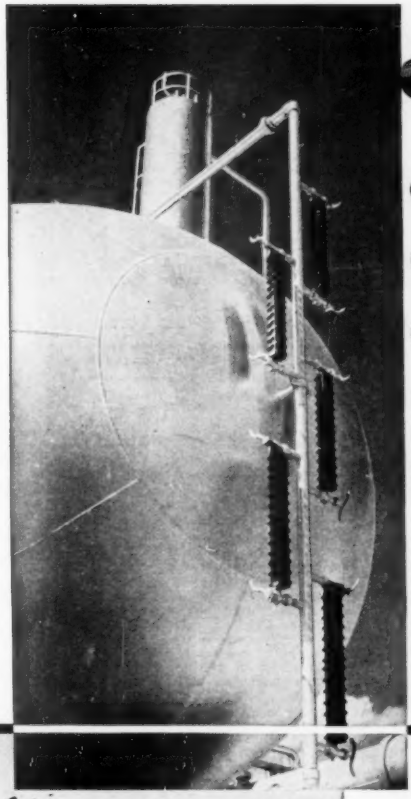

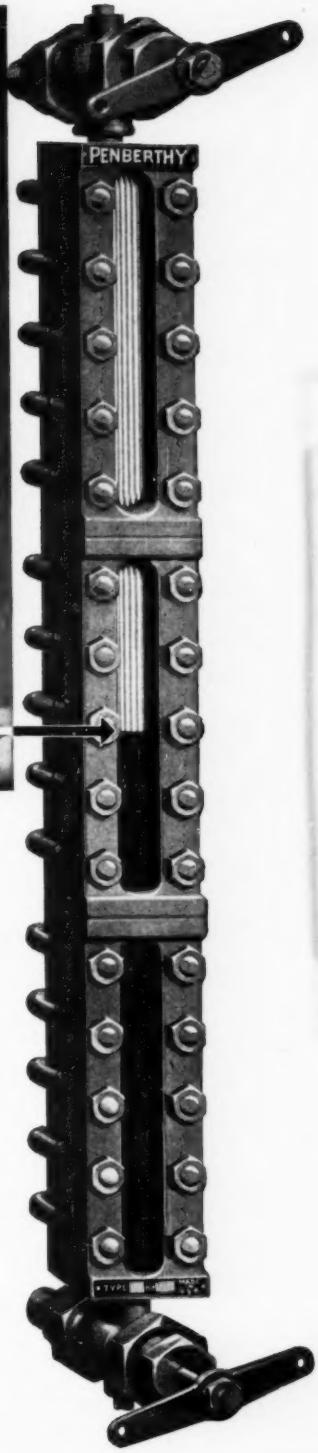

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G. C. Oexner 1 W. B. Adamson, W. L. Chittenden Subd., N½ League 336, McMullen & McGloin Sur., 1½ mi. W Radium, dry, TD 3,150 ft., Valera 1,500 ft., Dotham 2,300 ft., Flippen 2,735 ft., Hope 2,875 ft., Swastika 3,125 ft.

Roark, Hooker & Roark 1 J. R. King, Sec. 51, D&DA Lands Sur., 4½ mi. NE Anson, dry, TD 4,466 ft., Dotham 1,830 ft., Noodle Creek 1,915 ft., Saddle Creek 2,155 ft.

Montague County: H. G. Marshall, Inc., 1 S. V. Camp, Sec. 5, Limestone CSL, 3 mi. NE Stoneburg, dry, TD 6,198 ft., Caddo 5,922 ft., DST 5,980-5,900 ft., recovered light oil show and salt water, elev. 893 ft.

Shackelford County: Grenn & Dillard 1 W. D. Baker, Sec. 210, ETRR Sur., 3 mi. SE Lueders, dry, TD 1,950 ft., sand 1,637 ft., coal 1,672 ft.

Stephens County: Bond Oil Corp. 1 Ross Sloan "A," E. L. Walker Sur., 2 mi. NW Crystal Falls, dry, TD 4,535 ft., Caddo 3,392 ft.

Throckmorton County: Bridwell Oil Co. 2 J. C. Irwin, Jr., Sec. 1, SPRR Sur., 12 mi. S Throckmorton, dry, TD 802 ft.

Young County: C. H. Kadane 1 B. P. Roark estate, J. E. Rogers Sur., 1½ mi. SE Oil City, dry, TD 4,204 ft.

Lipscomb & DeLange 1 Adam Furr "A," Sec. 96, TE&L Sur., ¾ mi. N Padgett, dry, TD 5,084 ft., Caddo 4,445 ft., Barnett shale 4,882 ft., Mississippian 4,944 ft., Ellenburger 5,058 ft.

MICHIGAN

More Tests Will Follow New Southwest Discovery

MOUNT PLEASANT.—Fisher-McCall Oil & Gas, Inc., 1 Steckle, SE NE NW 6-4n-8w, Carlton Township wildcat, Barry County, flowed at the rate of 41 bbl. of oil an hour natural through the 5-in. casing after plug had been drilled. Over an extended period the well flowed approximately 330 bbl. in 16 hours. After the first 3 hours flow was gradually pinched back. Tubing was run later in the week and some difficulty in starting the flow was being experienced after this operation. Either hole had caved, shutting off the pay, or tubing disk had not been successfully knocked out. Well would flow through the casing, it was reported.

Several follow-up tests to this new southwest Michigan discovery were scheduled to be started within the next 7 days. The Carlton wildcat, a discovery which will be credited to Byron MacCallum, is the first hard-flowing well to be drilled in Barry County. Top of Traverse was logged at 2,007 ft. and hole is now bottomed out at 2,034-35 ft.

Tests of a Traverse gas-oil pay in John A. Thompson 1 Cox, NW NW NE 28-16n-10w, Green Township wildcat, Mecosta County, were in progress at a present total depth of 2,888 ft. At the present depth a gas pay was logged which showed 3,100,000 cu. ft. of gas on gage after a 2-hour blow-down period. A spray of oil which was showing with the gas developed into a flow of 55 bbl. of oil the first 24 hours on test. Following the blow-down test of the gas, well dropped to 2,800,000 cu. ft. in 5 minutes and to 2,710,000 cu. ft. in 10 minutes. Well flowed 12 bbl. of oil in 3 hours and 40 bbl. in 15 hours.

Traverse top was logged 2,869 ft. and the big gas show came in at the present total depth. Operators plan to set 5-in. casing at 2,888 ft. and drill ahead from 2 to 5 ft. in an effort to tap an oil pay.

The Green Township wildcat is located about 10 miles due south of Reed City oil field, Osceola County.

MICHIGAN WILDCAT FAILURES

Allegan County, Casco Township: Norman L. Stevens 1 Dopp et al, SE SE SE 26-1n-16w, Traverse 1,146 ft., dry, TD 1,156 ft.

Valley Township: Ohio Oil Co. A-45 U. S. of America CT, NW NW SW 28-2n-14w, Traverse 1,317 ft., dry, TD 1,352 ft.

Arenac County, Deep River Township: Walhalla Oil Co. 1 Tonkovich et ux, NE NE NW 29-19n-4e, Dundee 2,787 ft., dry, TD 2,953 ft.

Gladwin County, Hay Township: Ogma Development Co. and Basin Oil Co. 1 Schadd, NE NW NW 27-18n-1e, Dundee 3,563 ft., dry, TD 3,684 ft.

Lapeer County, Deerfield Township: Graham and Clarence Wilcox 1 Anderson, NW NW NW 8-9n-10e, Dundee 2,433 ft., dry, TD 2,515 ft.

Van Buren County, Geneva Township: Stuart L. Godfrey 1 Sheputis, SW SW SW 8-1s-16w, Traverse 1,059 ft., dry, TD 1,078 ft.

CANADIAN FIELDS

Ellis Discovery Hits in D3 for Dual Completion

CALGARY.—Canadian Gulf Oil Co.'s 1 Ellis, D2 zone oil discovery, this week also came forth with oil from the lower D3 Devonian horizon—making it a dual-zone discovery of high importance. The well, now at 5,355 ft., has 35 ft. of D3 pay open, and crew is continuing to core ahead.

First drill-stem test in D3 pay was run from 5,320-40 ft., giving a flow of crude at the rate of 73 bbl. hourly during the first hour. On the following 3 hours of test, oil flowed at a rate between 55 and 60 bbl. hourly. Second test, 35 ft. in D3, flowed oil at the rate of 40 bbl. hourly on a 2-hour run. Gas flow measured 504,900 cu. ft. daily.

D2 zone was contacted at around 5,185 ft. and showed 50 ft. of porosity. Tests in this horizon indicated potential of around 1,300 to 1,500 bbl. daily. Gravity of oil from D2 zone checked at 30° to 32° A.P.I., while that from the lower D3 zone of Devonian measured around 28° A.P.I.

The Gulf Ellis discovery is near Stettler, located in LSD 4, 10-38-20w4, about 100 miles northeast of Calgary.

Golden Spike.—Imperial Oil's two step-out tests in the Golden Spike area are making good drilling time, but so far have not given any encouragement. Both wells are logging lower than the discovery, and have shown water in the D2 zone of Devonian. Imperial-Golden Spike 2, located in LSD 3, 5-52-27w4, about 3½ miles northwest of the discovery, is drilling in search of D3 at 5,476 ft. Golden Spike 3, in LSD 2, 1-52-27w4, 3 miles northeast of the Schoepp discovery well, is drilling below 5,532 ft.

Redwater.—The Pacific-Atlantic-Sunray-Calvan team of oil companies has marked an important northwest extension to Redwater field with its P.A.S.C-Redwater 1, D3 zone of Devonian was contacted at an elevation of 1,161 ft., subsea—some 78 ft. above the indicated water line. The well, located in LSD 8, 10-58-22w4, is ¾ mile southwest of Imperial-Egremont 1 oil well in the northwest portion of the field, and about 2 miles northwest of the P. S. & P. group of producers. Production string of casing has been run and crew is preparing the well for production test.

Western Leaseholds, Ltd., of Calgary, has placed an additional two wells on production at Redwater—now rating 12 sizable producers from the young Redwater field. Both recent oil wells have open flow potentials yielding between 1,500 and 1,700 bbl. daily.

Smoky Lake.—The team of three large American independent oil companies, Barnsdall Oil Co., Honolulu Oil Corp., and the Seaboard Oil Corp. of Delaware, has commenced operations at its second seismograph-based wildcat test in Alberta. The new venture, located about 55 miles northeast of Edmonton, will be a Devonian test, with probable completion depth around 3,000 ft. Site is in LSD 1, 35-59-19w4.

Wildcat abandonments.—Redwater Consolidated-British Dominion 1 Zuk, LSD 15, 31-60-20w4, TD 3,404 ft. Bear-Maxgeorge 1, LSD 5, 25-69-20w4, TD 4,346 ft. Davies-Decalta Hondo 2, LSD 2, 23-70-1w5, TD 3,999 ft. Pan Western-West Edmonton 1, LSD 14, 21-52-25w4, TD 5,803 ft.

PERMIAN BASIN

Fusselman Yields Water In Dollar Hide Silurian

MIDLAND.—Cities Service Oil Co. 1-E Cowden, SE SE 14-A52-PSL, north outpost to Dollar Hide field of Andrews County, was said to have definitely eliminated the Fusselman section of the Silurian as a producing zone as water encroached on tests up the hole. Perforations were squeezed at 8,784-89 ft. when water developed, and new holes made from 8,645-80 ft. yielded only a small amount of oil after a two-stage acid treatment of 9,000 gal. The zone was then reacidized with 12,000 gal., which resulted in swabbing some 20 bbl. of sulfur water an hour, with no oil. Operators squeezed and were waiting on cement.

While the 1-E Cowden has flowed oil during drill-stem tests of the Devonian, it was believed further tests would be made in the Clear Fork and Wolfcamp sections, which showed oil while drilling.

On the southeast end of Dollar Hide field, Magnolia Petroleum Co. 18-B Cowden, NE NE 12-A-55-PSL, had flowing oil from the Fusselman as well as the Devonian. Perforations at intervals from 11,056-82 ft. were washed with 500 gal. of mud acid, then acid load and residue were swabbed off and the well kicked off, flowing through ⅜-in. choke. In 15 hours of flowing, the well produced 99 bbl. of 41.9°-gravity oil, with gas-oil ratio of 568 cu. ft. Further tests were to be made from perforations at 11,000-26 ft.

Upton County.—Republic Natural Gas Co. 1 V. P. Powell, NW NW 44-40-T4S-TP, reported light shows of oil while drilling the lower Permian to 7,775 ft., and prepared to drill-stem test. Location is 2 miles southeast of Magnolia's 1-A TXL, Ellenburger discovery of Pegasus field. The 1-A TXL also showed possibilities of production in the lower Permian.

Richardson & Bass 1 Henry F. and A. D. Neal, SE NW 8-Y-GC&SF, ¾ mile east of the same operators' 1 Neal, Pennsylvanian discovery in the Benedum area, was testing the Pennsylvanian through perforations at 10,485, 10,550, and 10,610 ft., after showing oil and fresh water in the Fusselman section of the Silurian. The well kicked off and flowed 6 bbl. of fluid an hour, testing 30 per cent oil and 70 per cent fresh water, for 10 hours, after 1,000-gal. and 3,000-gal. acid treatments of the Fusselman at 11,860-915 ft.

Slick-Urschel Oil Co. completed its 2 D. L. Alford, ½ mile west of the field's Ellenburger discovery, Lot 2, Section 50½, for a daily natural flowing potential of 905 bbl. of oil or distillate, flowing through ⅜-in. choke. The well had also indicated production in the Fusselman section.

Crane County.—In University-Waddell Ellenburger field, Gulf Oil Corp. 4-HH-D University, SW SE 3-31-University Lands, was a failure in the Ellenburger but plugged back from 11,080 to 9,250 ft. and completed in the Devonian for a daily flowing potential of 520 bbl. of 34.9°-gravity oil. Gas-oil ratio was 1,321 cu. ft. Open hole from 8,988-9,250 ft. was treated with 1,000 gal. of acid. Location is 3 miles north of Devonian production in Block 31 field.

Gaines County.—According to reports, sulfur water recovered on a drill-stem test from bottom of casing at 11,490 ft. and total depth of 11,571 ft. at Pacific Western

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Oil Corp. 1 Oil Development Co. fee, SE SE 315-G-CCSD&RGNG, between the Seminole and Russell fields, was from a faulty cement job up the hole and not the section being tested. The Devonian section had good porosity and staining while drilling.

Ralph Lowe 1 Cunningham-Shell, 4-A24-PSL, ½ mile west of the north end of Doss Clear Fork field, was drilling ahead below 10,032 ft. after recovering 630 ft. of oil and gas-cut mud, plus 6,900 ft. of sulfur water on a 3-hour drill-stem test in the Devonian from 9,900-50 ft.

Scurry County.—Humble Oil & Refining Co. made location for its 1 Wright Huddleston approximately SE SW 163-97-H&TC, west of its Sharon Ridge Canyon discovery. Contract depth is 7,000 ft. Location is ¼ mile west of the field's second well.

Humble 1-B Walker Huddleston, NW NW Section 161, was showing for the area's third Canyon producer. A drill-stem test from 6,700-25 ft., open 1 hour and 33 minutes, had gas in 3 minutes and flowing oil in 7 minutes. It flowed into pits for 26 minutes, then turned into tanks through 1-in. opening on top and ½-in. bottom choke. In 1 hour it gaged 65 bbl. of 43.5°-gravity oil, with no water. Gas-oil ratio was 845 cu. ft. Operators prepared to run 5½-in. casing on bottom at 6,725 ft. and complete.

A second well was in prospect in the northwest extension area to North Snyder at Standard Oil Co. of Texas 6-1 Brown, in the northwest quarter of Section 439. A 3¾-hour drill-stem test of the Canyon lime from 6,935-88 ft. had gas at the surface in 6½ minutes and oil in 2 hours and 40 minutes which flowed 6½ bbl. of oil in 1 hour, through ¼-in. choke. Sample top on the Canyon was corrected to 6,935 ft. It was drilled to 7,013 ft. for another drill-stem test. Location is an east offset to Humble's 1 Perriman.

WEST TEXAS (DISTRICTS 8 AND 7-C) WILDCAT FAILURES

Tom Green County: American Republics Corp. 1 Harrington, SE SE 1829-L-Strauss Sur., east side Concho River, dry, TD 6,668 ft., Strawn 5,568 ft., tested gas-cut mud and trace of oil, elev. 2,040 ft.

Placid Oil Co. and Ohio Oil Co. 2 L. T. Clark, NW SE Sec. 2, HE&WT Sur., dry, TD 1,135 ft.

Sun Oil Co., Perkins & Green 1 Mark B. Pulliam, SE SE Sec. 8, H. M. Wells Sur., 5 mi. W San Angelo, dry, TD 6,100 ft., Strawn 5,457 ft., elev. 1,963 ft.

SOUTHEASTERN NEW MEXICO

HOBBS.—Plans for a 15,000-ft. test, if necessary, to explore the Ellenburger were disclosed this week by Magnolia Petroleum Co. The proposed wildcat is the 1 Rose Eaves, SE SW 35-16s-38e, 10 miles east of Lovington field, and a south offset to the company's 1 Hamilton, a Devonian discovery.

Amerada Petroleum Corp. 1 Caudle-Federal, 10-12s-33e, 1 mile south outpost to its 1-BTA State, Pennsylvanian-Devonian discovery northeast of Caprock field, was completing a successful drill-stem test in the Pennsylvanian at 8,900-9,030 ft. During the test the well flowed some 80,000 cu. ft. of gas daily. Drill pipe was being pulled after the 4-hour test.

The 1-BTA State, which also showed gas and oil at the same level, was drilling ahead below 11,225 ft.

Two miles southeast of the Hobbs field, Ralph Lowe 1 Frank Sellman, 1-19s-38e, recovered 710 ft. of oil and gas-cut mud, plus 90 ft. of clean oil, on a 3-hour drill-stem test from 7,552-7,630 ft. It was drilled ahead to 7,665 ft., in the lower Permian, and prepared to retest.

SOUTHEAST NEW MEXICO SUCCESSFUL WILDCAT

Lea County: Magnolia Petroleum Co. 1 Betenbaugh, SW SW 12-9s-35e, 5 mi. NW Crossroads Devonian field, flowed 510½ bbl. 50°-gravity oil in 24 hr., ¼-in. choke on 2-in. set at 9,630 ft., Pennsylvanian pay 9,617-35 ft., GOR 1,600 cu. ft., TP 1,400 psi., CP 300 psi., TD 9,641 ft., elev. 4,130 ft.

SOUTHEAST NEW MEXICO WILDCAT FAILURE

Lea County: Amerada Petroleum Corp.

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1-WMA State, NW NW 34-19s-35e, dry, TD 3,492 ft., anhydrite 1,780 ft., salt 1,910 ft., Yates 3,470 ft., elev. 3,709 ft.

OHIO, KENTUCKY

Gas Wells Reported in Two Counties in Ohio

COLUMBUS.—Allen Willey moved east from the Perryton extension and ran into gas on George Wolford, Lot 14, Jackson Township, Muskingum County. Clinton sand at 3,294-3,348 ft. gaged 400,000 cu. ft, which will probably be tubed natural.

W. H. Morrow drilled in a second gas well just north of the Bladensburg pool in Jackson Township, Knox County, on Orion Mavis, Section 7. Clinton sand was reported at 2,841-86 ft. with 438,000 cu. ft. natural.

W. B. Hambleton et al are drilling near the bottom of the Niagara lime in a wildcat on Martin Klick, Section 21, Perry Township, Stark County. Benedum-Trees is still cleaning out and pumping water on its St. Peter test in Mayfield Township, Cuyahoga County.

John Galey et al have started two wells near old wildcat tests that showed oil. The 1 A. F. Davis, Lot 4, Hambden Township, Geauga County, is 2,500 ft. northwest of an Oriskany test. The 1 E. W. Hatfield, Lot 19, Charlestown Township, Portage County, is 1,600 ft. northwest of a Clinton test.

WESTERN KENTUCKY

OWENSBORO.—Interest again moves to the central part of Union County with another prospective producer in the area just south of the town of Morganfield. J. Burhans, S. Lewis and Basin Drilling Co. 1 Addie Y. Lilly, 21-O-19, had saturation in the Waltersburg at 1,842-52 ft. and a show of oil and water at 1,852-57 ft. A drill-stem test at 1,842-52 ft. had a recovery of 240 ft. of oil-cut mud. Another test, taken at 1,842-57 ft., recovered 150 ft. of oil, 30 ft. of oil-cut mud and 180 ft. of salt water. Casing has been set to 1,700 ft. The well also had a slight show of oil in the Pennsylvanian at 880-90 ft.

This prospective well is about 1 mile east of production in South Morganfield pool. This pool was opened in March of last year with production from a Pennsylvanian sand. Waltersburg production was added in May and by the end of the year the pool had 9 completions in the Pennsylvanian and 12 completions in the Waltersburg. A small amount of production was added from the McClosky and the Hardinsburg.

Sun Oil Co. has added Tar Springs production in the recently opened Rogers Landing pool in Henderson County. Sun 2 Roy E. Duncan, 23-O-25, had an initial production of 41 bbl. per day from the Tar Springs at 1,673-84 ft. Total depth is 1,977 ft. The new well is about 1,200 ft. south of the discovery well, 1 Duncan, which was completed as a small Cypress producer last month.

WESTERN KENTUCKY SUCCESSFUL WILDCATS

Henderson County: Sun Oil Co. 2 Roy E. Duncan, 23-O-25, IP 41 bbl., Tar Springs 1,673-84 ft., TD 1,977 ft. (New pay in Rogers Landing pool.)

Ohio County: J. M. Murphy et al 1 R. M. Hunt, 18-N-31, IP 28 bbl., Jackson sand, 971-85 ft., TD 995 ft.

WESTERN KENTUCKY WILDCAT FAILURE

Butler County: O. L. Sturbois 1 Taylor, NE¼ 2-J-35, dry, TD 1,083 ft.

EASTERN KENTUCKY

ASHLAND.—An unusually good gas well for Big Sandy gas field was completed last week by Kentucky-West Virginia Gas Co. The well, 5667 Hibbard Thacker in Pike County, made a total of 2,850,000 cu. ft. of gas daily from the Berea sand and the Big lime, both Mississippian in age. Total depth was 2,924 ft. Another test in the same field and county, 5845 Wesley Branham, was completed at 4,060 ft. for 380,000 cu. ft. daily from the Devonian black shales and the Big lime.

In Powell County, 17-P-69, 1 mile northeast of Furnace gas field, Raydure & Marcum 1 Robert Bellamy is apparently a failure. St. Peter sand topped at 2,599 ft. has had no gas showings to a depth of 2,625 ft. However, operators will drill through formation before abandoning.

In western Powell County and some 8 miles northwest of Furnace gas field the deep test of A. H. Carpenter 1 James Hall is drilling below 4,500 ft. and is evidently designed to test Cambrian sands. Drilling is progressing slowly, with cable tools being used.

(Continued on page 135)

LA.-ARK.

Barnsdall Tests Distillate In New Cotton Valley Pay

SHREVEPORT—Barnsdall Oil Co. 1 Ardis & Co., NE NW 27-22n-11w, Bossier Parish wildcat, about 3 miles south of the Sarepta area, had flowing production from the Cotton Valley, and was also believed to be producing from a new sand of that formation.

Preliminary tests gaged 187.8 bbl. of 55.8°-gravity, yellow-colored distillate in 16 hours and 20 minutes flowing through ¼-in. top and ⅝-in. bottom chokes. Flowing tubing pressure ranged from 1,350-1,475 psi., with packer set on casing. Gas volume was gaged at 1,710,000 cu. ft. daily, for a gas-oil ratio around 6,200 cu. ft.

The well had flowed into pits for an unreported length of time and, based on the combined flow, was estimated good for 275 bbl. of oil or distillate a day. Perforations were from 9,156-86 ft., in what has been identified as the Ardis sand.

Caddo Parish.—Near the Texas border in Longwood field, Phillips Petroleum Co. 1 Hammack, 6-18n-16w, completed for 213 bbl. of 38°-gravity oil from perforations in the Pettit at 5,650-64 ft., plus 26 per cent salt water. The well was drilled to 9,428 ft. in the Cotton Valley, and showed for a new pay discovery in the "D" zone of that formation. Casing was set at 8,435 ft. and the lower zone sealed in favor of completion in the regular pay for the area.

Arkla Oil Co. made location for its 6 Pitts, 150 ft. west of center of 11-23n-16w, for a second Smackover test. It is in the same section as the company's 5 M. L. Pitts. Smackover lime discovery in Rodessa field, which flowed gas plus distillate estimated up to 35 bbl. per day, from perforations at 10,821-45 ft.

Claiborne Parish.—On the south side of East Haynesville field, J. R. Frankel 1 J. W. Maddox, NE NE 28-23n-7w, became the first Smackover producer for the area. From perforations at 10,145-60 ft., the well gaged 412 bbl. of 46.7°-gravity oil a day, flowing through 15/64-in. choke. Tubing pressure was 2,500 psi., and gas-oil ratio was 520 cu. ft. Total depth was 10,576 ft.

Webster Parish.—The northern end of Cotton Valley field received a 1-mile west extension at A. J. Hodges Industries, Inc., 1 Logan Unit, 2-21n-10w. Completion was made in the Bodcaw zone of the Cotton Valley formation, with perforations at 8,647-57 ft. Flowing through 16/64-in. choke, the well gaged 380 bbl. of 42.5°-gravity oil, with gas-oil ratio around 1,000 cu. ft. Casing was packed off; flowing tubing pressure was 650 psi. Total depth was 9,007 ft.

Arkansas.—The second test for new Loutre Creek field of Union County, MacMillan Petroleum Co. 1 Barney Sullivan, NW SW 35-18s-15w, was drilling ahead below 3,000 ft. after setting 9⅝-in. casing to 1,607 ft. Location is a southwest offset to the discovery.

According to field reports, Magnolia Petroleum Co. was planning a repressuring program for old Lisbon field of Union County. Location has been made for the first of several proposed tests, about 8 miles northwest of El Dorado, as the 1 Brutus Harrell, Unit 112, SE SE 4-17s-16w. Contract depth was 2,200 ft.

Marine Oil Co. 1 Winn, SW SW SW 11-18s-13w, east of Urbana field, was waiting on pumping equipment for completion tests. Perforations were around 2,650 ft.

CALIFORNIA

Deep Drilling Activity Continues at High Rate

LOS ANGELES.—The number of deep wells in California continues to run high. This holds for both exploratory and field wells. Eight wells, all over 10,000 ft., were completed recently. All were producers drilled in proven fields.

The best of these wells is Western Gulf Oil Co. 54-1 Paloma Unit in Paloma field, 1-32s-26e, Kern County. The well completed with initial production of 575 bbl. of 33°-gravity oil, 0.6 per cent cut, and 439,000 cu. ft. of gas at 1,200 psi. casing pressure. Production is through perforations at 11,625-11,724 ft., 11,753-11,933 ft., and 12,000-12,333 ft. Total depth was 12,336 ft., elevation 290 ft.

Currently there are 23 other wells in various stages of completion, all over 10,000 ft. The deepest is Standard Oil Co. 5 Mushrush in Wasco field, 7-27s-24e, Kern County. The well is now coring below 15,444 ft.

Two new producers have increased the importance of Guijarral Hills field. Barnsdall Oil Co. brought in the 3-2-7 Dessel at 8,975 ft. for 743 bbl. of 36.1°-gravity oil per day. Standard of California followed with initial production from their 82-3H well of 1,555 bbl. per day. Standard 26-35F, now nearing completion, also looks like a sure producer in this field. Guijarral Hills production comes from the Leda sand. In general the sand is topped at about 8,700 ft. continuing to around 8,900 ft.

Superior Oil Co. nas staked an eastern offset to its 18-25 Buzzard at South Cuyama. The new location is northeast of Richfield 11-36 Hibbard. The structure at the new well is believed to be 95 ft. lower than Richfield's Homan discovery well.

Honolulu Oil Corp. has run liner and is completing 67 Alferitz in the Devils Den area of Kern County. This deep zone discovery on swabbing test showed 220 bbl. of 18°-gravity oil. Santos shale was topped at 1,340 ft. Wagon Wheel, the new producing zone, was topped at 1,540 ft. with Kern River at 2,460 ft. Total depth is 2,505 ft.

CALIFORNIA WILDCAT FAILURES

Kern County, Ant Hill area: Amerada Petroleum Corp. 8 Siegfus, 22-29s-29e, dry, elev. 812 ft., TD 1,300 ft.

Round Mountain area: E. A. Bender 3 S.P., 23-28s-28e, elev. 856 ft., TD 2,658 ft.

McKittrick area: Standard Oil Co. 16-Z-45 Spreckles, 16-30s-22e, plug 1,228 ft., bailed water, elev. 1,051 ft., TD 4,411 ft.

Trico area: Trico Oil & Gas Co. 1 Trico-Independent-Sawyer, 10-25s-22e, formation test 2,810-48 ft., recovered muddy water, elev. 221 ft., TD 4,600 ft.

Los Angeles County, Placerita Canyon area: Algord Oil Co. 5 Shepard, 1-3n-16w, dry, elev. 1,407 ft., TD 1,225 ft.

San Luis Obispo County, Cholame area: C. W. Colgrave 16 Jack, 2-25s-15e, dry, elev. 1,160 ft., TD 4,710 ft.

Atascadero area: Mar-Roo Syndicate 1 O'Reilly, 26-28s-12e, base Miocene 1,450 ft., elev. 950 ft., TD 1,835 ft.

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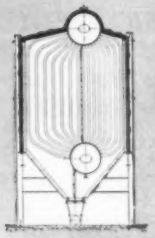

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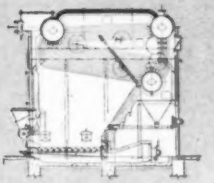

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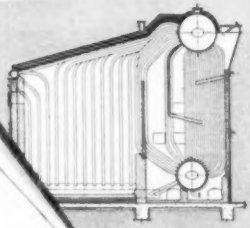

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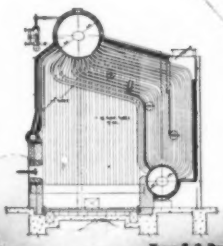

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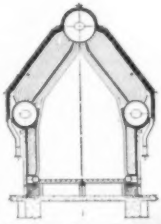

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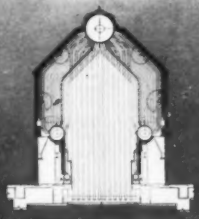
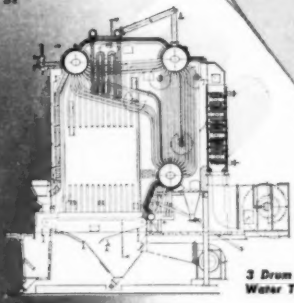
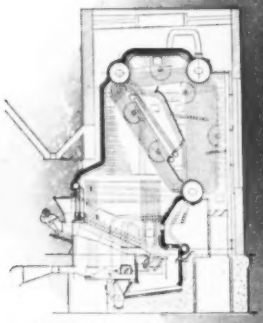


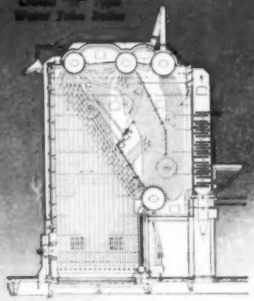
Oscar "A" Type Water Tube Boiler



3 Drum "B" Type Water Tube Boiler



3 Drum Water Tube Boiler



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International

WORLD-WIDE OIL DEVELOPMENTS

Granting of New Concessions In Venezuela Being Considered

THE Venezuelan government commission studying a national oil policy for the country has asked the oil companies for both factual information and opinions on a wide range of subjects dealing with the industry.

A 20-point questionnaire was presented to managers of the companies by Dr. Pedro Ignacio Aguerrevere, minister of fomento who organized the commission. It shows the complete scope of industry operations which is under investigation by the commission.

It is felt that the commission's recommendations may result in the offering of new concessions in Venezuela for the first time since 1944. There are a number of areas of interest, including some near the Cretaceous producing fields in Western Venezuela.

New Company Formed

Reports from Caracas last week told of the organization of a new Venezuelan company with Venezuelan and American backing. It is Cia. Promotora Nacional de Industries with a subsidiary company, Cia. Nacional de Petroleos. It was said this organization would seek oil concessions. The formation of another company, Cia. Venezueliana de Refinacion de Petroleo, also was reported with the object of constructing a 25,000-bbl. daily at Puerto la Cruz to handle government royalty oil if a contract is obtained.

The oil-policy commission is expected to make its report sometime this summer. It is made up of prominent Venezuelan engineers and officials.

Recently reported statements by the minister of fomento indicate that officials of the Venezuelan Government which came to power in the military coup of last November are cognizant of the necessity of measures to keep Venezuelan oil competitive in world markets and also of the importance of oil to the country's economy.

Speaking of the country's oil resources, Aguerrevere said: "It is not sensible to lock the door on a national treasure and throw away the key. With the development of substitutes and new sources of energy, later generations might find the treasure gone."

Venezuela recently issued regulations implementing the law providing for taxes equal to company profits, the so-called 50-50 plan inaugurated by the previous government. There is some speculation that this plan may be modified later.

The companies operating in Venezuela are now formulating their replies to the commission's detailed request for information. Its interest in the concession situation is indicated by questions asking how long the companies need to explore fully existing grants, exploration cost data, and drilling plans.

Other questions ask information on the probabilities of increasing reserves on presently owned concessions, the amount of oil the company intends to produce during the next 5 years to meet ordinary market requirements, and personnel and financial requirements of future programs. The commission also asked if the company would be willing to explore and drill new concessions.

Refining Plans Sought

The companies were requested to state their plans regarding refining in the country, the use of natural gas produced with oil, minimum percentage of annual profits invested in exploration and production during the last 10 years, and the amount the company would be willing to invest in the future. The commission requested company opinions on the significance of synthetic petroleum production, consequences to the Venezuelan petroleum industry of developments in the Middle East, measures advisable for closer cooperation between the government and the industry, and the effect of the Venezuelan petroleum industry on cattle raising and other industries in the country.

Ships Being Prepared for Offshore Work in Mexico

Five vessels are now at Vera Cruz preparing to commence exploration work in the Gulf of Mexico off the southern coast of Mexico.

Edwin W. Pauley, who with American Independent Oil Co. and Signal Oil & Gas Co., recently contracted with Petroleos Mexicanos to undertake development in Mexico, said last week in Mexico City that his group will spend from $3,000,000 to $5,000,000 in test drilling this year.

The contract provides for work in offshore submerged areas; Pauley said the ships now at Vera Cruz will operate off the coasts of southern Vera Cruz, Campeche, and Tabasco.

New Minister of Petroleum Is Named in Colombia

Jose Elias del Hierro has been appointed minister of mines and petroleum in Colombia in a cabinet reorganization by President Ospina Perez.

The new minister, a writer and lawyer, is a Conservative Party senator from the State of Narino, in southwestern Colombia. The former minister, Samuel Arango Reyes, was among the six Liberal Party cabinet members whose resignation caused the reorganization.

One of the major problems facing the Colombian ministry is the organization of the new official or semi-official company which the congress authorized last year to take over De Mares concession when it expires in August 1951. This company is described as now being in the promotional stage. Minority foreign capital participating with government or Colombian nationals is authorized, and the position of the various groups is expected to be known the latter part of this year.

Schoonebeek, Western Europe's Largest Field, Now Producing 11,300 Bbl. Daily

by W. Th. B. Reimering

International

Schoonebeek field in The Netherlands is at present the largest oil field in Western Europe. Present production is about 11,300 bbl. daily, of considerable importance in view of the fact it is the only production in the Low Countries and a substantial part of Western Europe's total indigenous output. Some data on the field were published in The Oil and Gas Journal, September 16, 1348, page 70. The present article presents a more comprehensive review of developments. The operating company is N. V. Nederlandse Aardolie Mij. The author is connected with N. V. de Bataafsche Petroleum Mij., The Hague. The operating company is controlled by B.P.M. and Standard Oil Co. (N. J.).

IN May 1943 oil was produced for the first time in the Netherlands. The rather small production of 6 bbl. of heavy, viscous crude was bailed in well S2 from a layer in the Purbeckian (Upper Jurassic). About a year later, however, on July 10, 1944, well S3 was completed as a producer in the Valanginian oil sand, flowing about 125 bbl. of a similar type of crude per day.

Very little progress in development was made until Holland had been liberated, however, due largely to the uncooperative attitude of the Dutch during the German occupation. In spite of some difficulties in connection with timely provision of drilling and production materials and scarcity of skilled personnel, development after the liberation was rapid although, to some extent, makeshift solutions were necessary to maintain operations.

Geology

A typical well log shows about the following picture of formations and their thickness and composition:

Quarternary: 460 ft. loose sand and gravel.

Tertiary: 590 ft. brownish gray and greenish gray clays and sandy clays.

Cretaceous:
Upper Cretaceous (Turonian and Cenomanian)—1,080 ft. white limy and clayey marls.
Lower Cretaceous (Albian)—360 ft. clayey marls, which in middle Albian are often reddish brown; (Hauterivian)—49-66 ft. clayish sand often impregnated with oil; (Valanginian-Weald)—66 ft. claystone, 100-300 ft. loose sand, oil-bearing shales with many shell fragments (Cyrena).

Jurassic:
Purbeckian—500 ft. shales with marlstone, oolitic limestone and layers of shell fragments, locally oil bearing (Well S2).
Lias—1,000 ft. claystone; basis of Lias has not been reached yet in any of the wells.

The Valanginian oil sand usually found between 2,650 and 2,800 ft. is medium to fine-grained and has good reservoir properties (maximum porosity 39 per cent, maximum permeability 10,000 md.).

The permeability of the Hauterivian sand is low, and no influx of oil was obtained in any of the wells where this sand was tested.

The electrical resistivity of the Valanginian pay sand is unusually high—values up to 4,000 ohmmeters have been observed. This feature is explained by the very low content (less than 3 per cent) of connate water, especially in the upper part of the layer. Towards the bottom the sand becomes more clayish and the electrical resistivity decreases accordingly.

Fig. 1 shows the present conception of structural conditions. In the west a broad anticline exists, which narrows towards the east. Several longitudinal normal faults have shown up. The most regular part of the structure is the northeast flank. On the crest a downthrown block is found, which extends to well S34. The central western part is most disturbed, and the structural interpretation here is not yet definite. The axis of the structure is rising towards the west and the oil sand accordingly abuts against the Albian plane of unconformity somewhere west of the existing field. A continuation of sand development on the flanks, is, however, indicated, which feature is being investigated. The productive area is further limited by the edge-water boundary, which occurs at the —880 m. (2,890 ft.) contour line on top of the Valanginian oil sand all around the structure. Only in the crestal trough is the edge water found at a lower level, namely at least at —921 m. (3,020 ft.).

Spacing and Grid of Location

Several factors exert influence on the choice of spacing and locating wells:

1. The geological structure. It appears that the partition of the structure by faults requires drilling in each block to a certain extend on its own pattern.

2. The texture of the oil layer. There exists some lenticularity due to the occurrence in the main sand body of streaks of varying permeability. Towards the east a clay break is developed, dividing the pay in an upper and lower member. On the flanks the lower member is sometimes water-bearing, while the upper part is productive in oil.

3. The thickness of the oil layer, which increases from 85 ft. in the west to 108 ft. in the east.

4. The reservoir characteristics of the oil layer. The rapid encroachment of edge water in some of the flank wells points to the existence of an active water drive. Wells situated higher on the structure, however, seem to produce under conditions of depletion.

5. The viscosity of the crude, which has an average value of 114.5 c.s. at 122° F.

It appears that some of the factors oppose each other as far as their effect on the spacing of the wells is concerned. The high permeability, for instance, justifies a wide spacing, while the high viscosity of the crude demands a smaller distance between wells. Provisionally, the field has been drilled up on a 40-acre spacing scheme. In the oldest part of the field some wells have been drilled on a 10-acre-spacing scheme. With the German company "Wintershall," which operates in the German part of the structure (Emlichheim field), a spacing agreement for a strip of 1,300 ft. on both sides of the frontier has been concluded, which is also based on a 10-acre-spacing scheme. It is yet uncertain whether the present spacing of 40 acres will be maintained and interspaced drilling, which would reduce the grid to 12 acres, may be considered, especially for the prolific eastern part of the field.

Drilling

During the German occupation the discovery well S3 had been drilled.

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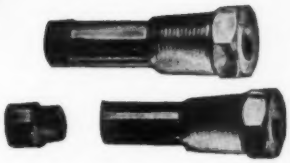

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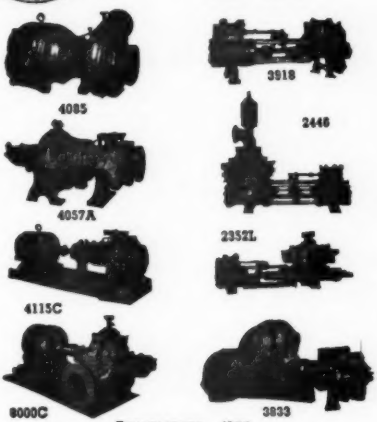

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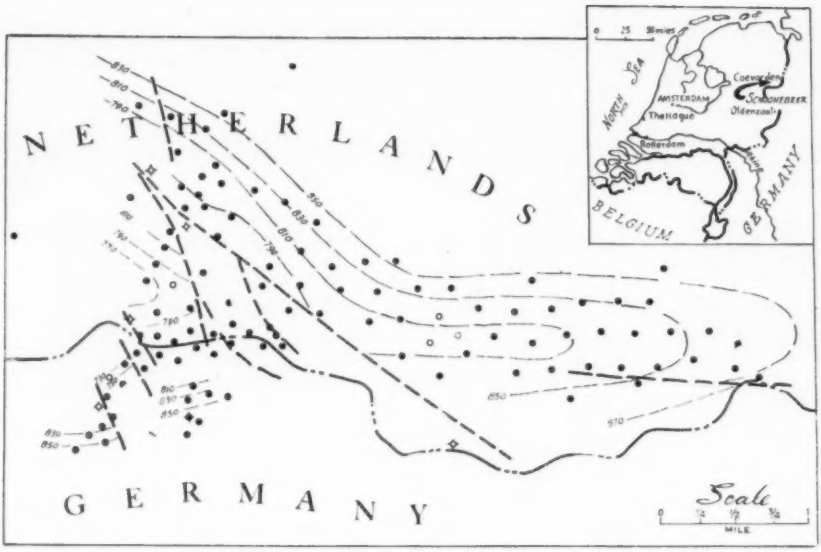


Fig. 1—Drawing showing structural conditions and well locations in Schoonebeek field. Insert shows location of field

At the time of the liberation, May 1945, well S4 had not yet been completed. All available equipment was speedily concentrated in Schoonebeek field in order to raise the output of the field as quickly as possible. It consisted of two old-fashion Alliantza rigs and one 10-ton Demag outfit. The Alliantza rigs were intended for percussion drilling, but by a few changes had been adapted to the rotary system. Rigging up took much time on account of the large foundations required and of the heavy weight and unwieldy dimensions of the composing parts. Drilling also progressed slowly due to the low speeds of drum and rotary, the underpowered engines, the low capacity of the pumps, and other defects. In the Demag rig chain transmissions had been replaced as far as possible by gears. A rather complicated piece of machinery was the result. Rigging up had to be done very precisely and took much time. Drilling results were not better than with the Alliantza outfits. Still, by good organization and the use of better means of transport, it is possible to reduce the time for moving from one location to the other from 6 weeks to 2 weeks. The time for drilling a well was gradually reduced from 3 months to 16-21 days. During 1946 about 5,000 ft. per month were drilled with the three installations and one and one-half producers per month could be completed.

Soon after liberation four new rotary installations were ordered, which arrived in 1947. With three of these it proved possible to drill an average of 15,000 ft. per month. Drilling time varied from 8 to 13 days per well and time for moving from 2 to 4 days. About five producers per month were completed.

Drilling itself does not entail unusual difficulties; 9⅝-in. casing is cemented at around 100 ft. After 12 hours' hardening, 8½-in. hole is carried down with two-way drag bits and rock bits to the presumable final depth. Before entering the oil sand the mud is treated in order to inflict as little damage as possible on the productive capacity of the layer. With the aid of an electric log the depth of the oil sand and the cementation point of the water string are determined. Seven-inch casing is cemented above the oil pay. After 24 hours' hardening of the cement the hole is cleaned and 5-in. slotted liner run. The width of the slots is rather important as according to sieve analyses only 10 per cent of the sand grains have a diameter larger than 1/100 in. By the use of 1/50-in. slots sand can be prevented from entering the liner.

Production

The crude has a specific gravity of 24.8° A.P.I. It contains 5-6 per cent paraffin. The maximum pour point usually varies between 43° and 54° F., though higher values up to 73° F. have been observed in isolated cases. There is little gas present in the reservoir, namely 56 cu. ft. per barrel of oil. The initial reservoir pressure amounted to around 1,250 psi.

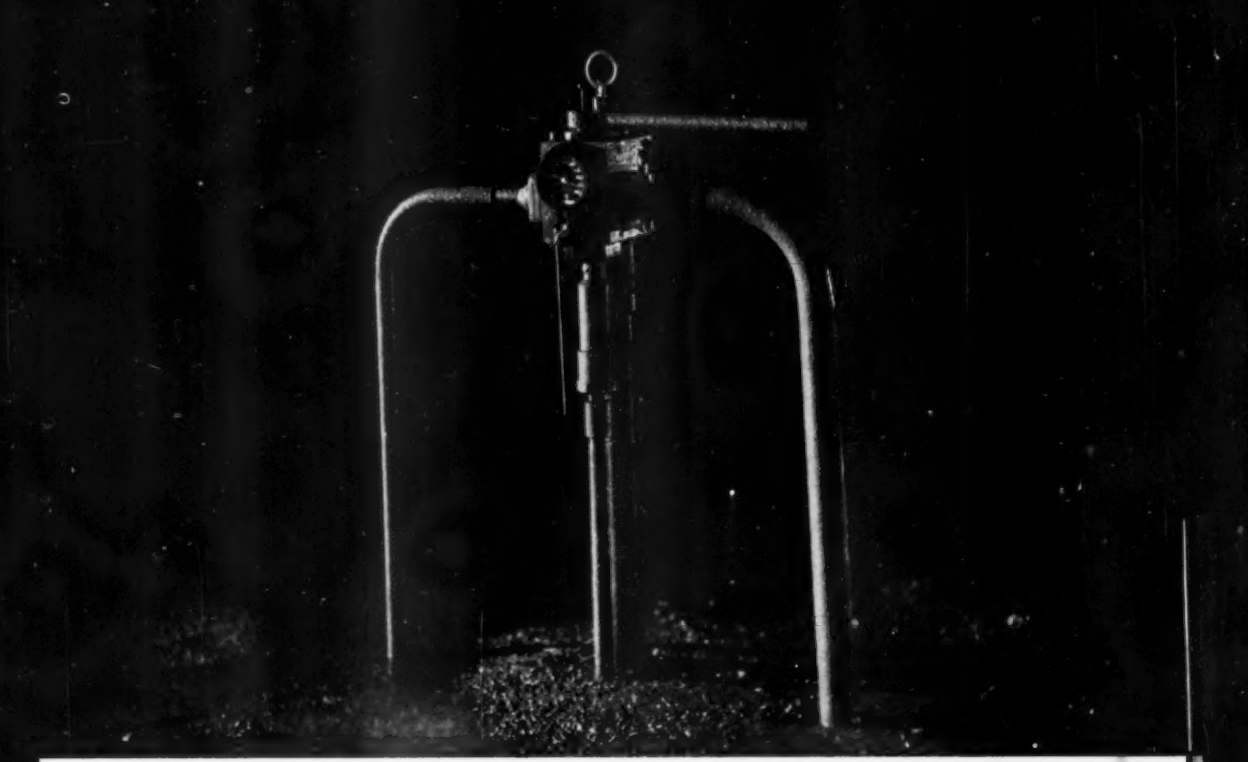
In virgin parts of the field wells flow for a short period, but in most wells pumping has to be resorted to right from the beginning. Liner pumps of 2, 2½, and 3-in. diameter are in common use. Electrically driven twin-crank pumping installations designed for a maximum polished-rod load of 15,000 and 20,000 lbs. respectively and a maximum stroke of 54 in. and 72 in. respectively have been installed on the wells.

Initial productions in the west amount to about 220 bbl. toward the east, increasing to 630 bbl. per day per well. Paraffin deposits occur in the upper part of the tubing down to about 1,300 ft. At regular intervals tubing and rods have to be cleaned of paraffin. An experiment is being made with plastic-coated tubing and rods, to which it is hoped that the paraffin will not stick. The flow lines to the block stations are being steamed at regular intervals to remove gradually accumulating paraffin deposits.

The block stations serve an area with a radius of about 2,000 ft. The crude of 11-15 wells can be gaged and collected on each station in two 250 and two 500-bbl. tanks. Gas is collected from a separator and used as fuel for heating the crude to about 113° F. For this purpose, low-pressure boilers are used, which are connected to open stand pipes 26 ft. high. The water is heated to about 230° F. and circulated through the heaters of the incoming crude, the coil in the separator, the coils in the tanks, the heater of the outgoing crude and back to the open stand pipes. The collected crude is pumped with about 900 psi. into a 6-in. insulated trunk line, which runs along the block stations to the tank farm. The trunk line is provided with a 1½-in. inner tube, through which hot water is pumped when deemed necessary to combat paraffin deposition.

Servicing of the wells does not present unusual difficulties. It is mostly done to replace paraffin-coated tubing and rods, to run new pumps, to fish broken rods, etc.

In May 1947 the first edge water appeared in the production of Well S19. At the moment 13 wells with a total net yield of about 2,300 bbl. daily show a varying cut with salt water. This salt water contains about 110 g. of total solids (mainly sodium chloride and a little calcium and magnesium chloride) per liter, corresponding to 38,500 lb. of salt per 1,000 bbl. of water. A rather tight emulsion of the water-in-oil type is formed, which



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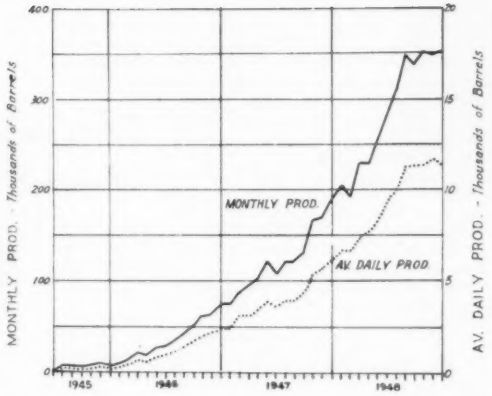

Fig. 2—Production graph of Schoonebeek field

does not break by heating alone. After testing with many chemical compounds, satisfactory dehydration appeared possible only with one. Electrical dehydration and desalting, however, is preferred because the aforementioned chemicals have to be imported and considerable investments may be necessary for additional settling facilities. An electrical pilot plant has been in operation since July 1948, and a larger plant is now being erected. A desalting phase will in any case be needed, as the salt content of the crude after dehydration to say 0.5 per cent of salt water is still too high for refinery requirements.

As the field is situated in a highly cultivated area, disposal of the salt water in ponds or surface streams is not feasible. The salt water is therefore pumped back into the oil sand down in the flank of the structure, for which purpose a disposal well has been drilled and more are planned. The water is treated first by aerating over a slab, mixing with alum, lime and copper sulphate, settling of the precipitates, and cleaning by filtering through gravel and sand. As the settling pits turn out to be rather expensive, a closed system is now being tried. When using this method

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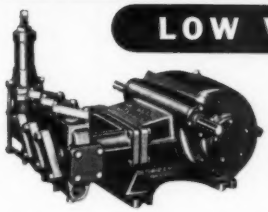

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the growth of algae will be prevented by the addition of suitable chemicals while any iron hydroxides settling on the sand face of the disposal well will be removed by occasional acidizing.

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Shipping of the Crude

In the initial period of the development the crude was transported by tank trucks and trailers either to a nearby canal, where it was loaded in barges, or to a railway station at the nearby town of Coevorden, whence it was shipped by rail tank cars. With increasing production, trucking became more and more onerous. Shipping by barges through the rather narrow canals also met with increasing difficulties, while during long severe winters when the canals froze in, it came to a complete standstill.

Transport by pipe line to the refinery at Pernis near Rotterdam was considered. However, the nature of the crude required many heating stations along the line. Moreover, the execution of the project would have consumed too much time due to the world shortage of line pipe. A solution finally was found whereby the Netherlands Railways laid a branch line to a point close to the field. The 6-in. trunkline through the field was extended to the railhead, where also the tank farm was built. The crude is heated here to 158° F. before it is loaded into the rail tank cars and thus shipped to the refinery. The round trip of trains, which carry about 6,000 bbl. of crude, amounts to 2¼ days.

Transport by tank truck or trailer is now confined to servicing new and isolated producers which have not yet been linked up to a block station.

In conclusion of this article reference is made to Fig. 2 showing the daily and monthly production of Schoonebeek field. A rate of 11,300 bbl. of crude per day is being maintained, which is considered the technical and economical optimum capacity of the layer in its presently known extension. The monthly total of around 345,000 bbl. is about the same as the total monthly production of all the German oil fields together. At present Schoonebeek field is the largest oil field in Western Europe.

totaling 110,000 cu. m. (about 690,000 bbl.) at nearby Cugno Point and a pipe line between Megara and Cugno Point.

Tierra del Fuego Well Claimed by Argentina

YACIMIENTOS PETROLIFEROS FISCALES, the Argentine Government oil agency, is reported to have made a discovery on the eastern part of Tierra del Fuego near the southern tip of the South American Continent.

The location is a short distance from the drilling activities of the Chilean Government's Corp. de Fomento which, with American technical assistance, made the initial Tierra del Fuego discovery in December 1945. Tierra del Fuego Island is divided by the north-south Argentine - Chilean boundary, and YPF has one rig in the area.

The Argentine discovery showing both gas and oil was reported in YPF's Rio Grande well which was drilled to 1,950 m. (about 6,400 ft.) The Rio Grande River crosses the boundary about 70 miles southeast of the San Sebastian structure in Chile where Corp. de Fomento has drilled two unproductive wells. The main Chilean field is at Cerro Manantialles, about 50 miles north of San Sebastian.

The Argentine discovery apparently indicates that the Cretaceous producing sand extends over a wide part of the island. Only the single producing sand, however, has been found thus far. This formation apparently rises to the east in the direction of the old shore line.

The Chilean organization expects to have its fourth rig in operation in the area within a month or 6 weeks. Two rigs are drilling in Cerro Manantialles, and a third is testing in the second well on the Espora structure about 7 miles north of Cerro Manantialles.

Danciger Refinery to Leave Houston June 20 for Reerection in Sicily

THE former Danciger Oil & Refining Co. plant at Longview, Tex., is scheduled to leave Houston about June 20 by chartered steamer for Augusta, Sicily, where it will be reerected and operated by RASIOM (Raffinerie Siciliane Olii Minerali, S.A.).

The plant is now being moved to the port at Houston where about 20 days will be required for further disassembly, packing, and loading. About 90 per cent is being transported to Houston by truck, and the remaining extra-large pieces by rail.

It will be shipped direct to Sicily by the Italian flag vessel G. Fassio, according to L. M. Jarach, president of Industrial Overseas Technical Corp., New York. It is scheduled to be in operation there by about the first of next year.

The shutdown refinery, which produced aviation gasoline during the war, was bought from W. C. Berry and associates, Tulsa. Modification during dismantling was carried out by Delta Engineering Corp., and engineering work was performed by Universal Oil Products Co. It will be operated on the more corrosive Middle East crudes, and some relining is being done while equipment is still in the United States. Industrial Overseas Technical Corp. is a brokerage and export firm which figured in the transaction.

The plant was bought complete by RASIOM except for the tankage. It will be the first petroleum refinery in Sicily, and with the changes, is expected to run between 10,000 and 11,000 bbl. daily.

Total weight of the equipment on ship is estimated at around 4,000 tons, with a volume of about 300,000 cu. ft. Some equipment, including four columns more than 55 ft. in length, will be deck loaded.

RASIOM is a 100 per cent Italian company which is carrying out the refinery project without participation of the Economic Cooperation Administration. Erection and operation of the plant in Sicily is a part of a program for the industrialization of southern Italy. It is estimated that about 85 per cent of the products, including bunkering oil, will be consumed locally.

Actual location of the new refinery is Megara which is about 5 miles from Augusta. The company has leased former Italian Navy storage

Commission to Study Oil Supply of West Germany

A five-man commission has been set up by American and British authorities in Germany to study and make recommendations regarding future supplies of petroleum to western Germany.

The commission is to work out the most economical method of meeting oil requirements. It was organized at the suggestion of the Bipartite Control Office and consists of two Allied government officials and representatives of Shell, Socony-Vacuum Oil Co., Inc., and Anglo-Iranian Oil Co., Ltd.

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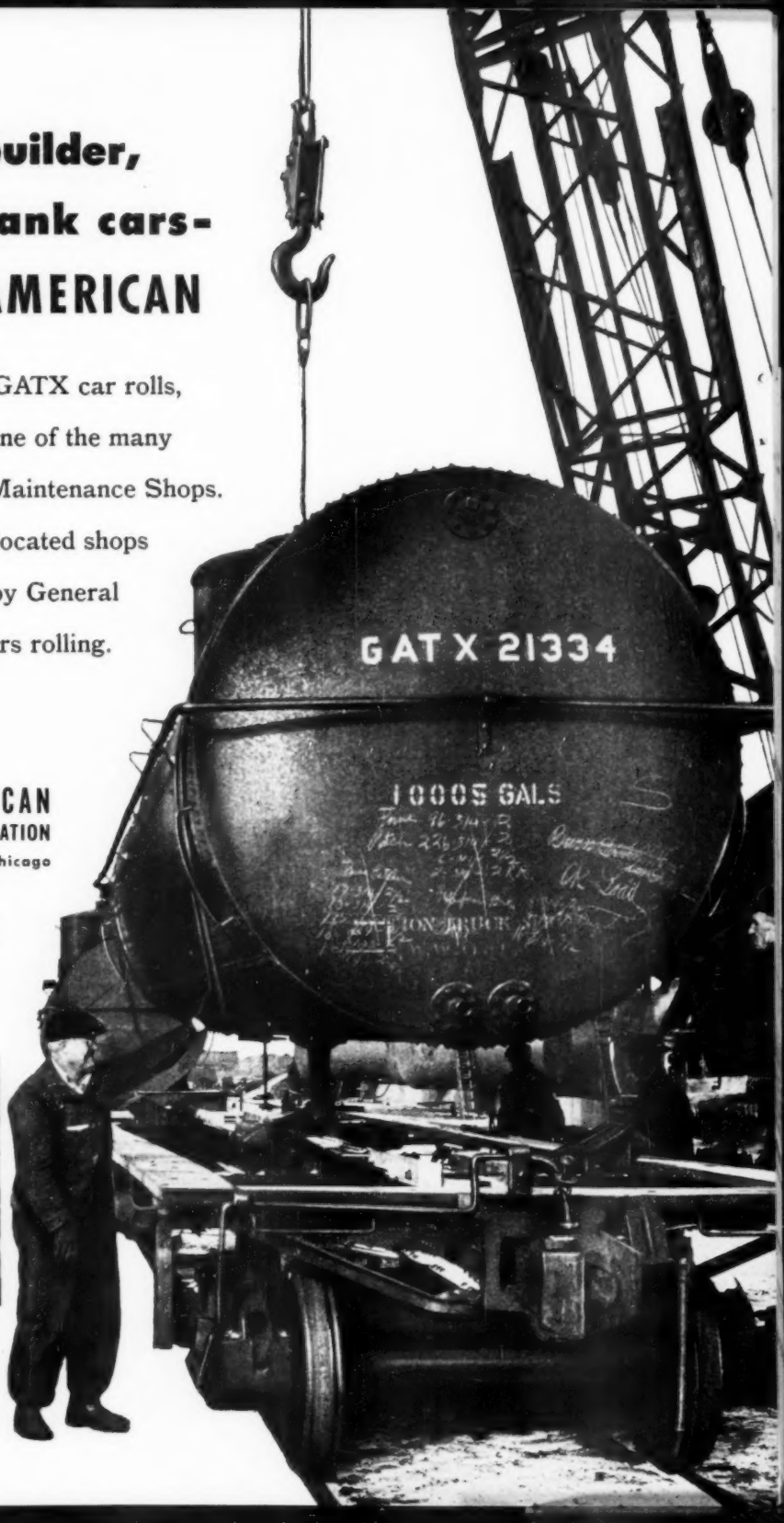

Olds Opposes Gas Act Changes In Hearing on Kerr-Thomas Bill

WASHINGTON. — A Senate interstate commerce subcommittee sought last week to get to the bottom of the dissension among members of the Federal Power Commission over revision of the Natural Gas Act. It found the going slow.

Subcommittee Chairman Lyndon Johnson, of Texas, called all five members to give their views on the Kerr-Thomas bill, although only Leland Olds had asked permission to testify.

The bill would exempt independent producers and gatherers of natural gas from FPC control.

Olds is a member of the majority, including Claude L. Draper and Thomas C. Buchanan, which opposes any change in the act. Chairman Nelson Lee Smith and Harrington Wimberly favor clarification of the law.

Olds was the first commissioner to testify. His prepared statement ran 91 pages, plus charts and maps, and, with constant interruptions by subcommittee members, took several days to read.

Opposes Any Change

The position of the majority on the commission with respect to revision of the Natural Gas Act had previously been set forth. It was a flat "No" to all suggestions that the law be amended by bobtailing FPC authority at either end of the pipe lines.

Throughout the reading of his statement, Olds repeatedly tangled with members of the subcommittee, particularly when he attempted to charge the oil and gas industries with a deliberate drive to revise the law. At one point, however, he was severely criticized for what Sen. Ernest W. McFarland of Arizona termed unwarranted insinuations against the staff which prepared the reports on the commission's natural-gas investigation.

The commissioner asserted that the agitation for restriction of FPC powers arose because the commission has been effective in regulating rates of natural-gas companies.

Olds said his position, in which Draper concurs, is that where field prices are determined in a free market by effective competition there is no need for exercise of the regulatory function but where, through affiliation, field agreement, or dominant position, an unreasonable or arbitrary price is maintained, "something must be done about it to prevent unfair treatment of the public."

On the basis of his analysis of the evidence in the natural-gas investigation, which led to his disagreement with the commission staff, Olds said, he and Draper were convinced (1) that a few great oil and gas companies were in a position to dominate the supply of gas to interstate pipe lines, (2) that arbitrary and unreasonable prices were threatened, and (3) that the Natural Gas Act as now on the books and as interpreted by the courts, contains ample authority to regulate field prices where such regulation is necessary.

Questioning of Olds brought out that under the act once a producer makes a sale to a pipe-line company and comes under FPC authority he can never escape. He cannot relinquish his contract with the pipe line except with FPC approval and he is under an obligation to continue to supply the pipe line as long as there is gas in the reserve which he has dedicated to that purpose. To that end, Olds said, the commission probably could make the producer drill additional wells in a proven field, although no case involving that point has ever come before it. The commission, however, could not require a producer to drill any wildcat wells in order to provide additional gas for a pipe line.

Olds also disclosed that he does not believe the Department of Justice or Federal Trade Commission have any role in the control of the natural-gas industry, and where regulation might be necessary to deal with monopolistic tendencies in field, price fixing or where conditions might arise in violation of the Sherman Act those situations would come within the province of the FPC.

Most Could Be Exempt

Olds admitted that 90 per cent of the independent producers in the seven southwestern producing states and 97 per cent of the independent producers in the country as a whole who make sales to interstate pipe lines could be exempted from FPC jurisdiction "without substantially affecting the regulatory situation," but he contended the commission must retain its jurisdiction over the remaining independent producers "if its regulation of wholesale rates at the market ends of interstate pipe lines is to remain truly effective."

"True," he said, "there are approximately 2,300 independent producers of natural gas in the United States who sell to pipe lines, but the great bulk of the sales is by a relatively few large companies. It would also appear that the small producers, in order to obtain a market for their gas, often have to cooperate with the large producers who have the gathering facilities, etc. These large companies are the ones who will benefit most by the bill under consideration, in my opinion. They are in a dominant position. Most of them are not at the mercy of pipe lines, as is the 'little' fellow, as they could finance lines of their own if deemed necessary.

"Such companies are in a position to reap large fortunes if they can fix the price of the natural gas which they own. . . .

"The bill would, therefore, benefit primarily large enterprises. And it is my opinion that no occasion would ever arise for the commission to regulate the farmer or other individual small producers of natural gas."

Olds was emphatic in his assurances that the commission does not plan to attempt to take any control over oil production.

Boatwright Foresees 1949 Demands Above Last Year

The demand for all petroleum products except lubricating oils will be higher in 1949 than in 1948, and there will be ample supplies available to meet all needs, the Consumers Cooperative Association was told at its annual meeting in Peoria, Ill., last week by John W. Boatwright, economist of Standard Oil Co. (Ind.).

He forecast that demand for distillate fuels will be 10 per cent higher than last year and that no difficulties will be met in filling this demand unless consumers delay filling their tanks until the start of the heating season. Any shortage difficulties which develop will be the responsibility of consumers, Boatwright declared.

Estimates of demand for residual fuel oil differ widely, he said, but his own forecast is for an increase of 5 per cent over 1948, due to increased use as refinery fuel and reduction in the price to make it competitive with coal for industrial uses. Boatwright predicted that gasoline demand for the year will be 5 or 6 per cent above last year, but that lubricating oils will be off about 4 per cent, due to more efficient use by motorists and decreased industrial consumption.

W.P.R.A. Regional Meeting To Be in Wichita June 10

A regional technical-industrial relations meeting of Western Petroleum Refiners Association will be held at the Broadview Hotel in Wichita on June 10, John C. Day, executive secretary of the association, reported.

The program will be highlighted by a talk on "Refinery Cost Accounting," by Emory M. Skinner, chief refinery engineer of the White Eagle division, Socony-Vacuum Oil Co., Inc.

WASHINGTON WATCHING

BY BERTRAM F. LINZ

Study in Red

WASHINGTON.—Seizures of American oil properties in countries behind the iron curtain may be investigated by a Senate foreign relations subcommittee which has been set up to study claims against foreign governments which the United States Government and its nationals have been unable to collect.

The subcommittee will consist of Senators Theodore Francis Green of Rhode Island, chairman; Brien McMahon of Connecticut, and Alexander Wiley of Wisconsin. It aims to make a special study of such so far uncollectible claims as may be brought before it with a view of finding out what, if anything, can be done to expedite payment.

The only claim that this Government is pressing at this time is for the loss of United States planes shot down in Yugoslavia during the early days of the cold war, but American nationals have a lot of claims against a number of governments growing out of the nationalization of industry in the Russian satellite nations.

In at least two countries there have been major seizures of American oil properties, and the State Department has made strong representations to the governments of Romania and Hungary demanding that the companies be compensated, although officials admitted there was no way of forcing action to that end.

Since the foreign relations committee works closely with the State Department, it is assumed the diplomatic branch is in favor of a public airing of the treatment which has been accorded American investments in eastern Europe.

Operations, Ltd.

THE world oil situation has reached a point where the industry no longer is speculating on how much it should expand but is trying to figure how much it may have to cut back its operations.

This was made clear last week when it was made known that the Trans-Arabian pipe line will be built for its originally planned 300,000 bbl. daily capacity but that all idea of quickly expanding it to a 500,000-bbl. line, as was suggested a year ago when world oil supplies were tight, has been abandoned, for the present at least.

The oil companies with world-wide operations are carefully studying all phases of the programs they developed between the end of the war and last summer. Because of the dollar shortage, the American companies currently are in a none-too-favorable position to compete with sterling oil, which already has displaced dollar oil in Sweden and Argentina.

Top company executives, however, foresee the possibility that sterling may eventually become as tight as dollars, which would tend to even the competitive scales. They base that belief on the power to drive for exports which the United Kingdom is staging, which could well drain customer countries of their sterling reserves.

Industry leaders are not pessimistic over the situation, however. They see it as the inevitable shakedown which had to follow the big expansion of supply made last year, and believe it is nothing more than a period in which to mark time, until increasing consumption catches up with what at the moment is excess availability.

In Washington, the long-range view is that the American companies will be in a relatively good position at the termination of the European Recovery Program, with substantial business abroad and imports into the United States in the magnitude of 500,000-600,000 bbl. daily. Most company officials appear to agree.

One safeguard for the dollar companies is an evident intent on the part of the British not to press their advantages too far. They could, if they wished, open up their Middle East production and drive American companies pretty much out of the sterling markets. But they would then face a tremendous competition which would drive them out of the dollar markets. Also, the British want the United States to have a substantial stake in the Middle East, for political, strategic, and other reasons.

But It Didn't Work

OIL Industry Swindle by Big Business Racketeers" sounds like an American newspaper heading, but as a matter of fact it tops a story from Romania exposing an alleged plot to trim the Romanian oil company "Creditul Minier" out of 70,000 shares of stock in its French subsidiary.

Details of the scheme have been made available through the Romanian Legation in Washington, which said that while it was hatched in January 1947, it was exposed only last month in the Romanian press.

Named as the prime movers were the then general manager of Creditul Minier who seems to have lost his job almost immediately, a "big industrialist" and a former night-spot operator. They set up three dummy companies outside the country, identified as "Valor," "Sapiex," and "Meropa," with which the oil-company manager made a number of buying, selling, and lending transactions which it was charged later by the government were designed to carry out the swindle under the cover of normal commercial operations.

It's all very involved, but the documents were supposed to show that Creditul Minier had bought oil trucks worth 1,950,500 Swiss francs from Meropa with a loan from Valor for which the stock of the subsidiary was put up as collateral. The loan was to be paid off through Sapiex, to which Creditul Minier was supposed to deliver oil products during the first half of 1947 sufficient to pay for the trucks.

Sapiex was given the right to choose whatever products in whatever amount it liked, and the scheme appears to have blown up when it made the mistake of electing to take some 300,000 cars of aviation gasoline, an amount which it was disclosed would represent 40 years' Romanian output at the present rate of production, a fact which came out when the phantom companies brought action to seize the 70,000 shares of Creditul Minier stock for nonpayment of the loan.

Never Say Die

DEMOCRATS who couldn't get a tax-increase bill through Congress this year are doing some tall figuring on how they can avoid having to put one through next year, shortly before they have to ask their constituents to reelect them, and are coming up with some novel ideas.

There appears to be no question but that the Treasury will wind up the 1950 fiscal year some $3,000,000,000 in the red, and more if President Truman's program really gets rolling. Congressmen are racking their brains over how to keep the voters happy taxwise, at least until they have cemented themselves into their seats for another 2-year round.

The simplest proposal—maybe in more ways than one—has been advanced by Rep. Wilbur D. Mills of Arkansas, who would require merely that all corporations pay off their

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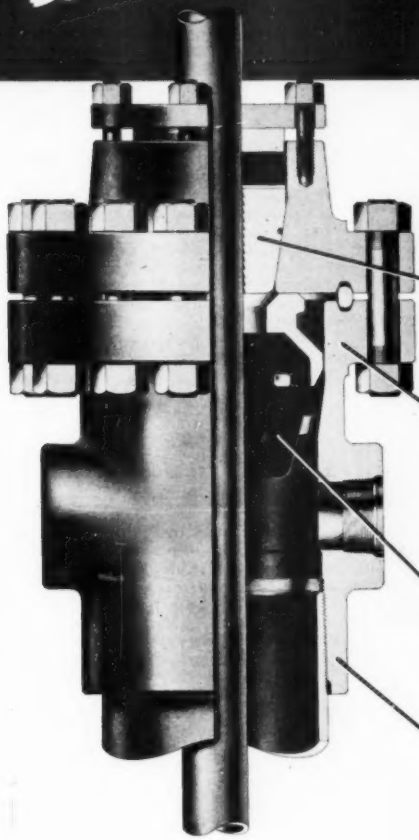

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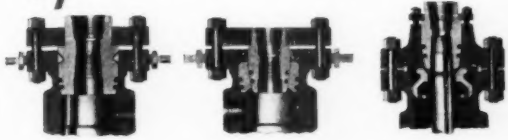

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1950 tax liabilities 6 months earlier than they would have to normally. This, Mills figures, would give the Treasury some $4,600,000,000 additional revenue, enough to offset the anticipated deficit and leave a little surplus. The idea, of course, is only a 1-year expedient, and no additional revenue would be developed in subsequent years.

Mills justifies his idea as a "long overdue reform" which would put corporations more nearly on a parity with individuals so far as the time for payment of taxes is concerned. He points out that most individuals are on a pay-as-you-go basis, while corporations may pay their taxes in four installments over the 12 months following the close of their taxable year, and his bill would reduce that time to 6 months.

Denominating the proposal a "fraud" and a "subterfuge," Republicans assert that Mills would make 75 per cent of the corporations of the country pay 1½ years' taxes in 1950, a period which many economists figure will be critical in determining whether the current recession will accelerate or taper off. Mills, however, says corporations might prefer to pay their taxes more promptly rather than have an increase in tax rates which he holds is inevitable unless a deficit can be averted.

1,000-Mile Oil Change Upheld by A.P.I.

THE 1,000-mile oil change took the spotlight last week as members of the American Petroleum Institute's Lubrication Committee held their semiannual meeting in Colorado Springs. Three papers presenting data on the effect of proper and improper oil-change intervals on the economy of passenger-car and truck operation, comprised the technical program.

A comprehensive presentation in the form of a progress report on "Effect of Oil Change Practice on Engine Condition" by William A. Howe, James F. Drake, Jr., and H. H. Donaldson, of Gulf Oil Corp., gave results to date on a relatively large-scale field test of company vehicles begun in October 1947.

The passenger car fleet of the Pittsburgh Sales Division, divided into three change-interval groups, is under study. Conclusions reached at this time are that the savings in oil cost at change periods of 2,500 and 5,000 miles were inconsequential as compared with increased maintenance costs, risks of engine failure, reduced oil mileage, and shorter vehicle life. The conservation angle was dismissed with the observation that reduced consumption of lube oils would not materially affect crude-oil consumption, since gasoline and fuel oils were the governing factors.

"The False Economy of Extended Oil Drain Periods," a report on road tests with trucks, revealed that trucks using a 6,000-mile drain interval wore out almost two and one-half times as fast as those draining their crankcases more frequently. J. P. Haworth, G. W. Jenkins and W. G. Perriguey, of Esso Standard Oil Co., further reported that of the passenger cars tested, those drained at 4,000-mile intervals used more than twice the amount of makeup oil required by engines drained at shorter intervals after 25,000 miles of service.

L. T. White, of Petroleum Advisers, Inc., urged that publicity be given the advantages of increased oil use in returning savings in operating and maintenance expenses. Dwight F. Benton, of Root Petroleum Co., defended the integrated activity of the oil industry, declaring that passage of the Gillette divorcement bills for the industry would result in increased prices for petroleum products.

Divorcement Attacked By Industry Speakers

PENDING legislation to break up integrated companies by divorcing the four principle operations in the oil industry were denounced at two industry meetings last week.

Speaking before the lubrication committee of the American Petroleum Institute in Colorado Springs, Dwight F. Benton, of Root Petroleum Co., Shreveport, La., said the legislation would "increase prices of petroleum products, diminish the availability of crude oil, weakening the ability to fuel a war, lower our standards of living, lose much progress and many years of work in petroleum research, and defeat ownership of American corporations by small stockholders."

"Integrated activity," Benton said, "is the central authority which directs and controls the four activities of the oil industry as a unit. It is the means by which we improve services and cut costs—not conspire against someone."

At Elmira, N. Y., the Empire State Petroleum Association was told by Charles F. Wagner, president of American Oil Co., that divorcement bills would result in oil shortages, high prices, and a slow, partial strangulation of the nation's supply of mobile power.

Pipe-line companies would delay building lines to new oil fields without assurance of sufficient oil to pay out, Wagner said, and producing companies would hesitate to open new areas without assurance of a market or means of transportation. Refiners would hesitate to develop new products until assured of a market at the refinery gate, and middle men would grow up at each point of ownership change and take their toll of operating expense and profit, he added.

In Washington the Federal Power Commission told the Senate interstate commerce committee it saw nothing objectionable in the three bills introduced by Sen. Guy M. Gillette of Iowa to divorce the various branches of the oil industry, provided they are so amended as to state definitely they are not applicable also to the natural-gas industry.

Although the commission had been asked to submit its views on the legislation, Capitol sources said no effort will be made to enact it this session and the matter may not even get as far as committee hearings this year.

The commission said that unless the bills were so written as to be definitely confined to the oil industry, the question would have to be decided by the courts, and while the final decision undoubtedly would be that they did not apply to the natural-gas industry there would be considerable "confusion" until the issue was settled.

On the other hand, the bills as now written might compel a complete reorganization in the natural-gas business, which was not intended by Gillette.

Reservoir Pressure in East Texas Field Is Increasing

Reservoir pressure in the big East Texas oil field—the nation's largest—is increasing steadily, due to closer control of crude-oil production.

Pressure increase has amounted to an average of 10.51 psi. in the last 6 months, climbing from the low point of 1,002.75 psi, as of November 1 to 1,013.27 psi. on May 1.

Bottom-hole pressure tests run on 98 wells in the field by the engineering staff of Texas Railroad Commission showed a gain of 3.82 psi. in April. Reduction of the number of producing days allowed the field in recent months, plus reinjection of a high percentage of salt water produced along with the oil, has kept reservoir pressure on the rise.

Significance of the situation is that thousands of wells will continue to flow under their natural pressure, while reservoir pressure remains sufficient to lift the column of oil and keep gas now in solution with the oil from separating and forming a gas cap.

Highest pressure recorded in the key wells tested was 1,225 psi., while 28 wells registered more than 1,100 psi., and 23 wells 1,000 psi. Key wells tested are owned by 10 different operators, scattered in all parts of the 130,000-acre field.

Plans for Oil Search in Okefenokee Area Opposed

WASHINGTON. — The Fish and Wildlife Service of the Interior Department, backed by the powerful Audubon Society and other organizations interested in the preservation of wild life, apparently has won an intradepartmental fight over oil prospecting in the Okefenokee national wild-life refuge in Georgia.

Opposition to the opening of this or other sanctuaries to oil development was disclosed last week by Interior Secretary J. A. Krug before a Senate subcommittee studying the department's appropriation bill for fiscal 1950.

The question was raised by Sen. Kenneth S. Wherry of Nebraska, apparently at the instigation of interests which have been seeking the opening up of the game and bird refuge. A department spokesman said later that among those interested is H. L. Hunt of Texas, who holds leases on private lands around the preserve.

Krug maintained that drilling would impair the refuge and disturb the wild life for whose protection it was established.

The suggestion that the wild-life refuges be opened to exploration was made early in 1948, when the Government and the industry were concerned about oil supplies, and the department was urged to throw those areas open under whatever regulations might be necessary to protect the animal and bird life. The Government has 271 refuges in this country.

Pure Oil Co. Sells Oil Properties in Mexia Pool

Pure Oil Co. has announced sale of its producing properties in the Mexia pool of Limestone County, Texas, to the Kilmarnock Oil Co. of Corsicana.

Involved in the transaction are 84 wells on 23 leases, with a daily production of approximately 450 bbl. of oil from the Woodbine sand.

The Mexia pool was opened in 1920.

Senate Committee Approval Given Buchanan Nomination

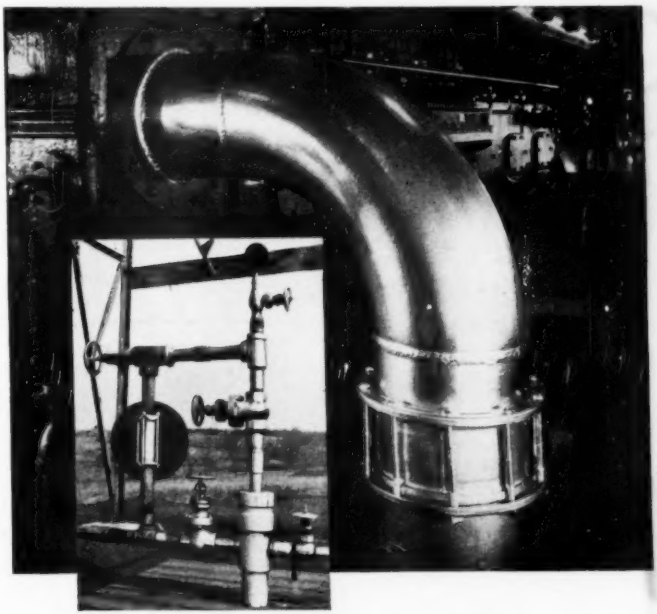
WASHINGTON.—President Truman last week was able to chalk up his first victory in three long-drawn-out fights with the Senate over appointments to high governmental offices when the Senate interstate commerce committee by a vote of 9 to 1 approved the nomination of Thomas C. Buchanan of Pennsylvania as a member of the Federal Power Commission.

Previously, the President had lost out in efforts to appoint Edwin C. Pauley as Undersecretary of the Navy and Mon C. Wallgren as chairman of the National Security Resources Board, and currently has a fourth appointment facing strong opposition, that of John Carson as a member of the Federal Trade Commission.

Committee approval of Buchanan came some 13 months after the President first sent his name to the Senate for confirmation in April 1948. A subcommittee to which the nomination was referred voted against it, 2 to 1, and since a canvass of the full committee indicated that Buchanan might be turned down by a 7-to-6 vote, the nomination was quietly tabled. After Congress adjourned, the President gave Buchanan a recess appointment, under which he has been serving on the commission.

There was no explanation for the big shift of sentiment in the committee which resulted in nine votes for approval and only one against, by Sen. Clyde M. Reed of Kansas. Senators Owen Brewster of Maine and John W. Bricker of Ohio were present at the meeting but did not vote.

Spearhead of the opposition to Buchanan's appointment last year was Sen. Edward Martin of Pennsylvania, who said he is still opposed and indicated he may carry the fight to the floor of the Senate.



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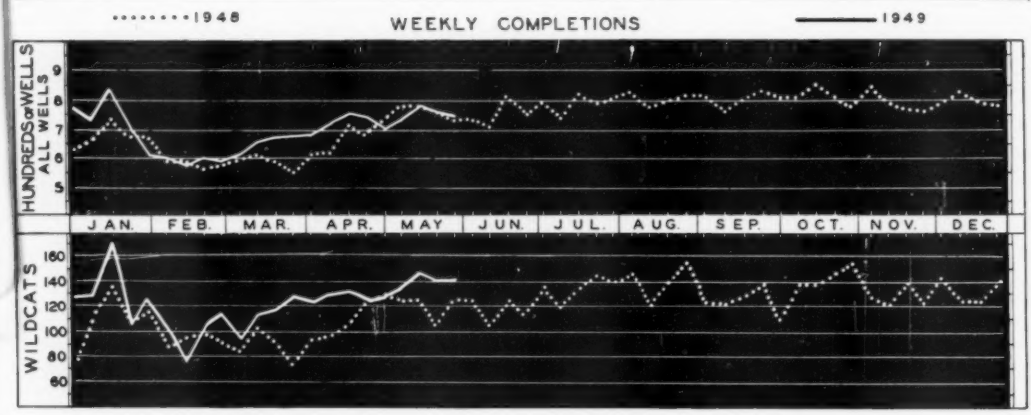
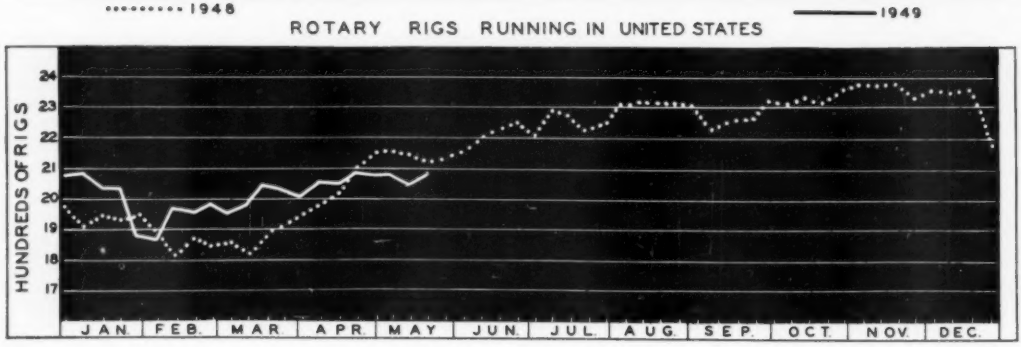
	Total of all wells					21 wk.		Wildcat completions and discoveries					Cumulative total, 1949				
	Comp.	Oil	Gas	Dry	Footage	1949	1948	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
New York	20	9	0	*11	20,938	489	614	0	0	0	0	0	0	0	0	0	0
Pennsylvania	30	11	8	†11	47,856	696	1,056	0	0	0	0	0	0	0	1	1	2
West Virginia	6	0	6	0	19,179	198	304	0	0	0	0	0	0	0	4	5	9
Ohio	20	5	3	12	35,439	430	500	0	0	0	0	0	1	0	2	18	21
Indiana	37	18	0	19	76,982	464	364	2	0	0	8	10	8	0	0	92	100
Kentucky	17	12	0	5	19,318	339	242	2	0	0	1	3	6	0	0	16	22
Illinois	77	34	1	42	168,098	830	768	4	0	1	14	19	16	0	1	147	164
Michigan	21	12	1	8	45,615	352	248	0	0	0	6	6	15	0	1	126	142
Kansas	63	33	5	‡25	211,881	1,168	1,094	0	0	0	8	8	21	0	2	146	169
Neb., Mo., Iowa	0	0	0	0	0	12	1	0	0	0	0	0	0	0	0	8	8
Oklahoma	80	44	4	‡32	274,489	1,614	1,526	2	0	2	12	16	59	8	8	227	302
Texas	248	146	24	78	1,063,014	5,205	4,342	7	2	2	46	57	166	21	46	910	1,143
North Central (Dist. 7-B & 9)	93	52	1	40	311,291	1,701	1,345	3	0	1	23	27	78	0	8	364	450
West (Dist. 7-C & 8)	56	49	0	7	283,907	1,175	1,158	0	0	0	3	3	22	0	1	84	107
Panhandle (Dist. 10)	29	11	17	1	93,073	434	222	0	0	0	0	0	1	0	0	1	2
Eastern (Dist. 5 & 6)	13	5	1	7	63,045	283	191	0	0	0	7	7	1	1	3	59	64
Gulf Coast (Dist. 2 & 3)	31	15	3	13	189,906	774	707	2	2	1	6	11	33	15	22	160	230
Southwest (Dist. 1 & 4)	26	14	2	10	121,792	838	719	2	0	0	7	9	31	5	12	242	290
Louisiana	31	18	0	13	197,594	778	784	1	0	0	4	5	20	6	1	76	103
Northern	15	10	0	5	56,101	396	520	0	0	0	0	0	1	0	0	32	33
Southern	16	8	0	8	141,493	382	264	1	0	0	4	5	19	6	1	44	70
Arkansas	0	0	0	0	0	112	117	0	0	0	0	0	2	0	0	25	27
Mississippi	4	3	0	1	28,457	146	152	1	0	0	1	2	4	0	1	41	46
Southeastern States	0	0	0	0	0	21	18	0	0	0	0	0	1	0	0	19	20
Montana	3	2	0	1	9,307	80	95	0	0	0	0	0	1	0	1	8	10
Wyoming	15	7	1	7	62,259	230	165	1	0	0	4	5	10	0	0	41	51
Colorado-Utah	4	3	0	1	13,412	52	98	0	0	0	1	1	1	0	0	21	22
New Mexico	9	5	1	3	39,420	219	245	1	0	0	1	2	5	0	0	19	24
California	50	41	0	9	201,919	1,062	1,122	0	0	0	7	7	19	0	2	180	201
Total United States	735	403	54	278	2,555,177	14,517	13,855	21	2	5	113	141	355	35	70	2,126	2,586
Total previous week	763	434	55	274	2,721,440	13,782	13,117	7	3	1	129	140	334	33	65	2,013	2,445
Total May 29, 1948	738	405	54	279	2,490,509			14	2	4	105	125	304	27	106	1,855	2,292

Service wells included: *11, †10, ‡1.





DAILY AVERAGE PRODUCTION FOR WEEK

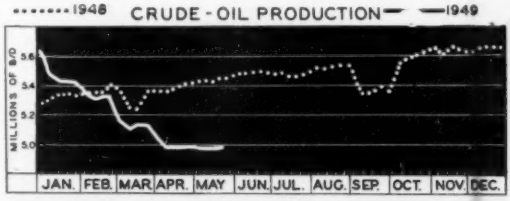
	May 28 crude oil	B. of M. May demand	May 21 crude oil
Alabama	1,200	1,550	1,200
Arkansas	80,250	87,000	80,000
California	939,200	950,000	938,200
Colorado	66,100	62,000	65,900
Eastern	61,650	60,950	61,800
Florida	1,250	1,450	1,375
Illinois	177,000	165,000	175,400
Indiana	25,000	22,000	25,400
Kansas	285,950	300,000	296,400
Kentucky	24,200	21,000	24,300
Louisiana	502,250	492,000	501,050
North Louisiana	117,650		116,450
South Louisiana	384,600		384,600
Michigan	42,300	46,000	45,300
Mississippi	106,600	120,000	108,500
Montana	26,700	24,000	26,700
Nebraska	250	700	300
New Mexico	129,825	126,000	129,825
Oklahoma	430,150	410,000	428,750
Texas	1,884,600	2,300,000	1,884,600
Dist. 1 (Southwest)	25,690		25,690
Dist. 2 (Southwest)	118,675		118,675
Dist. 4 (Southwest)	184,350		184,350
Dist. 3 (Gulf Coast)	357,210		357,210
Dist. 5 (Eastern)	34,475		34,475
Dist. 6 (Eastern)	83,525		83,525
East Texas field	247,400		247,400
Dist. 7-C (West)	42,225		42,225
Dist. 8 (West)	520,150		520,150
Dist. 7-B (W. Central)	56,725		56,725
Dist. 9 (N. Central)	125,400		125,400
Dist. 10 (Panhandle)	88,775		88,775
Utah	350	350	400
Wyoming	121,300	130,000	123,100
Total United States	*4,906,125	5,320,000	4,918,500
Change from prev. week, down	12,375		

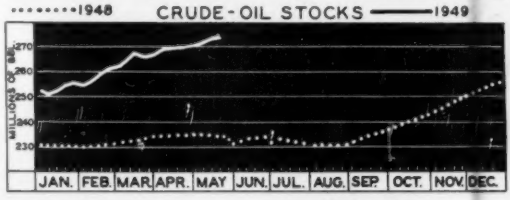
Total production January 1-May 28 ..... †774,469,000 bbl.
Same period last year (crude plus cond.) ..... 810,088,095 bbl.

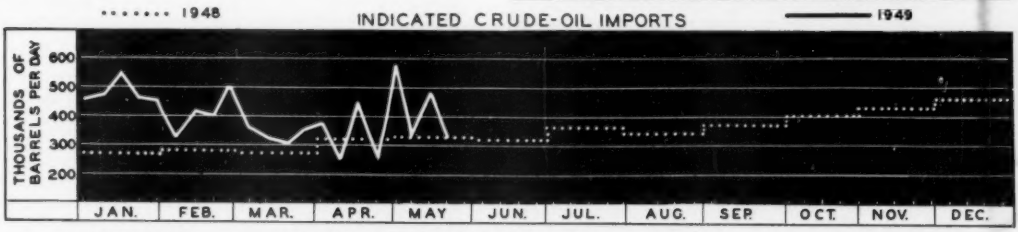
*Not including 82,090 bbl. condensate. †Including 12,551,045 bbl. condensate.

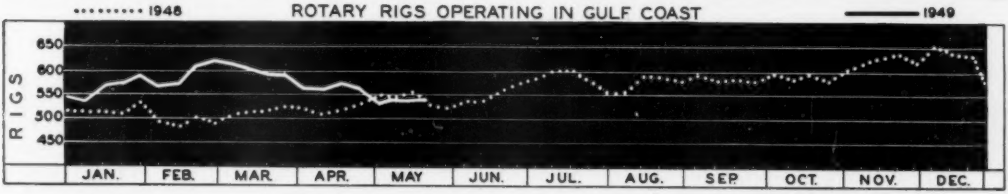
CRUDE STOCKS BY STATES OF ORIGIN
(Thousands of barrels)

State of origin—	May 21, 1949	May 14, 1949	May 22, 1948
Pennsylvania Grade	3,133	3,180	2,591
Other Appalachian	2,134	2,097	957
Ill., Ind., Mich.	14,458	14,527	9,629
Arkansas	3,052	3,001	2,916
Louisiana	14,346	13,830	12,440
North	3,155	3,172	3,210
Gulf	11,191	10,658	9,230
Mississippi	3,321	3,148	2,378
New Mexico	7,319	7,898	5,399
Oklahoma and Kansas	39,597	39,733	33,607
Texas	129,686	128,589	113,512
East Texas	17,890	17,805	16,275
West Texas	51,752	50,792	43,240
Texas Gulf	31,369	31,286	29,012
Other Texas	28,675	28,706	24,965
Rocky Mountain	13,592	13,358	9,050
California	35,153	35,492	31,011
Foreign	8,251	9,182	5,432
Total United States	274,042	274,035	228,922









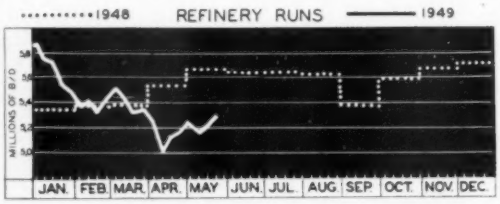
Refining Statistics

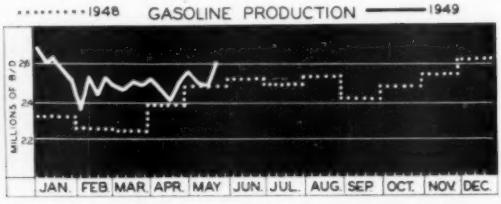
A.P.I. REFINERY REPORT, MAY 21

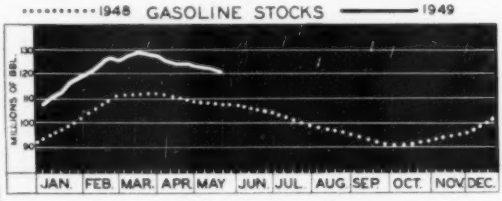
(Thousands of barrels)

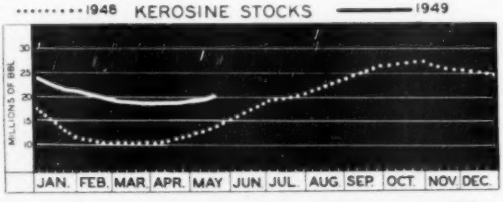
District—	Crude runs daily avg	Daily average production: Gasoline*	Kerosine	Distillate	Residual	Stocks at refineries, bulk terminals, in transit and in pipe lines: Gasoline†	Kerosine	Distillate	Residual	Bureau of Mines, May 1948: Daily avg. crude runs	Daily average production: Gasoline*	Kerosine	Distillate	Residual
East Coast	778	312.0	16.4	150.4	181.1	28,072	9,141	18,861	10,948	895	304.3	47.3	158.8	244.3
Appalachian:														
District 1	97	39.0	5.7	11.0	11.9	2,672	380	679	490	99	40.9	7.9	11.3	11.6
District 2	67	33.4	3.4	5.4	11.9	1,214	140	222	316	68	33.8	2.9	6.7	15.7
Ind., Ill., Ky.	950	517.1	54.3	122.3	144.4	27,424	3,183	8,358	5,440	899	449.8	58.5	116.9	166.5
Okla., Kans., Mo.	418	210.3	19.9	89.4	62.1	11,766	1,166	3,808	2,364	453	223.8	25.0	82.7	73.2
Inland Texas	225	146.3	17.6	17.6	49.3	4,851	473	657	1,147	247	159.8	14.7	24.3	59.9
Texas Gulf Coast	1,188	640.1	74.8	224.0	236.7	17,316	2,925	8,982	7,931	1,436	629.8	97.3	306.6	273.7
La. Gulf Coast	404	206.9	40.6	97.7	46.4	5,881	1,900	3,075	1,992	437	190.1	43.7	94.4	73.3
N. La. and Ark.	71	27.9	5.3	12.4	18.1	2,076	491	1,021	200	77	27.1	7.5	13.9	18.0
Rocky Mountain:														
New Mexico	11	6.0		1.6	3.6	90	25	54	28	13	6.8	0.4	1.9	3.5
Other Rocky Mtn.	147	71.3	5.3	25.6	35.9	3,369	299	1,188	951	147	68.2	4.3	24.7	33.4
California	951	394.0	10.4	125.0	392.0	15,738	541	7,377	31,273	897	351.1	12.2	150.2	340.8
May 21, 1949‡	5,307	2,604.3	253.7	882.4	1,193.4	120,469	20,664	54,282	63,080	5,668	2,485.5	321.7	992.4	1,313.9
May 14, 1949	5,216	2,500.8	243.7	831.6	1,217.0	‡121,268	19,750	52,476	61,993					

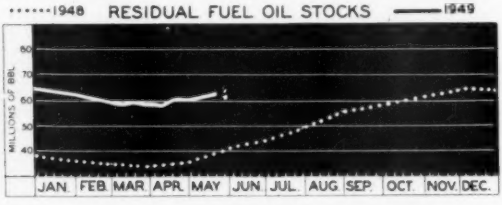
*At refineries including natural blended. †Finished and unfinished. ‡Comparable data for 1948 on new basis not available. §Revised.

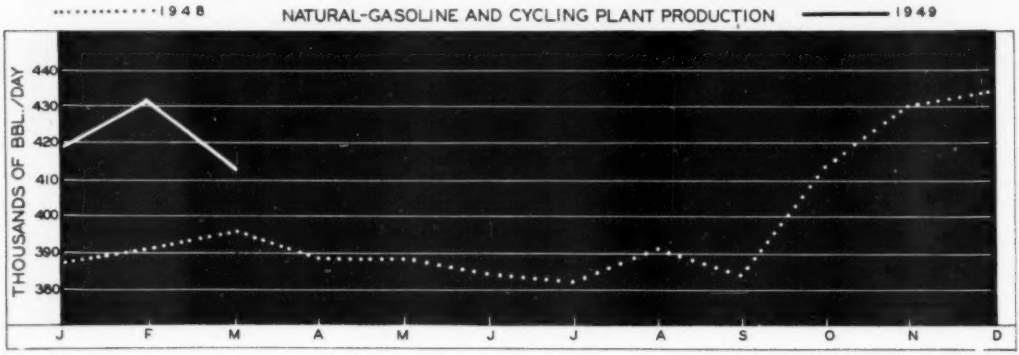












CRUDE PRICES GRAVITY SCHEDULE

Gravity—	Signal Hill, Calif.	Okla-homa, Kansas	Gulf Coast Tex.*	West Tex.†
18-18.9	$1.96			
19-19.9	2.07			
20-20.9	2.17	$2.25		$2.12
21-21.9	2.23	2.27		2.14
22-22.9	2.27	2.29		2.16
23-23.9	2.30	2.31		2.18
24-24.9	2.34	2.33	$2.56	2.20
25-25.9	2.38	2.35	2.58	2.22
26-26.9	2.41	2.37	2.60	2.24
27-27.9	2.45	2.39	2.62	2.26
28-28.9	2.49	2.41	2.64	2.28
29-29.9	2.52	2.43	2.66	2.30
30-30.9	2.56	2.45	2.68	2.32
31-31.9	2.59	2.47	2.70	2.34
32-32.9	2.62	2.49	2.72	2.36
33-33.9		2.51	2.74	2.38
34-34.9		2.53	2.76	2.40
35-35.9		2.55	2.78	2.42
36-36.9		2.57	2.80	2.44
37-37.9		2.59	2.82	2.46
38-38.9		2.61	2.84	2.48
39-39.9		2.63	2.86	2.50
40 and above		2.65	2.88	2.52

*For crude from Daboval, El Campo, and Sand Point.

†Includes Lea County, New Mexico. Last general price change represented a 50-cent increase becoming effective December 6, 1947. Above changes do not include recent reductions of a few buyers applying principally to low-gravity grades.

FLAT CRUDE PRICES

Representative posted schedules per barrel.

East Texas†	$2.65
Kettleman Hills, California*	2.64
Beauregard Parish	2.60
Illinois Basin	2.77
Pecos County, Texas (Yates)	2.35
Bradford, Pennsylvania	3.27
Eastern Ill. and Western Ind.	2.77
Tomball, Texas Gulf Coast	2.83

*37°-37.9°. †35° and above.

THE outstanding development in petroleum-products markets last week was the announcement by Esso Standard Oil Co. of its policy designed to protect resellers of No. 2 heating oil against price drops during the normal summer fillup season. This is an extension of the Esso's marketing program announced April 26, covering direct sales of heating oil to household customers.

If this plan is adopted by most of the major suppliers, it will bring about a more normal stocking program during the summer months and will help prevent the transportation overload that would otherwise come at the beginning of the heating season. So far this year very little heating oil has moved to distributors' and consumers' storage. If resellers and consumers are to have normal stocks at the opening of the heating season, sales of middle distillates must be above normal for the next 3 months. Further details on Esso's plan are included in a news story in this issue.

Gasoline suppliers are forecasting increases in sales with the formal opening of vacation season. Demands during the next few weeks should give some indication of the volume that can be expected for the summer months.

Domestic sales of motor vehicles in April passed the half-million mark, the greatest monthly total since 1929. Sales in the first 4 months of this year were 15 per cent above the same period last year. These are further markers pointing toward record gasoline demands this year.

Spot prices changed very little during the week and there is a growing feeling among marketers that both light and heavy fuel prices have reached bottom. Gasoline prices remained firm in all areas.

REPRESENTATIVE QUOTATIONS

Representative spot-market quotations of leading suppliers as of May 30, 1949. Figures are f.o.b. plant for tank-car shipment in cents per gallon, except for residual fuel oil which shows the price per barrel and wax, in cents per pound.

GASOLINE, KEROSINE, AND FUEL OILS

	Mid-Continent Group 3	New York Harbor (barge)	Tex. Gulf Coast
Regular gasoline, 73-75 octane	9⅝-9⅞	11.25-12	9¼-10
Premium gasoline, 78-80 octane	10⅜-11	12.25-13	10¼-11
42-44 w.w. kerosine	8-8½	8-8.4	7.50-8
No. 2 straw fuel oil	6¾-7	7.0-7.4	6¾-8½
No. 6 residual	$0.90-1.00	$1.60	$1.15-1.25

NATURAL GASOLINE

	Group 3	North Texas	N. La.
Grade 26-70	5¼	4¾	5
Grade 18-55	6.3	5.7	6.9

LUBRICATING OILS
South Texas

200 vis., No. 2-3 neutral	11
750 vis., No. 3-4 neutral	14
2,000 No. 5-6 neutral	16-16.5

LUBRICATING OILS
Mid-Continent

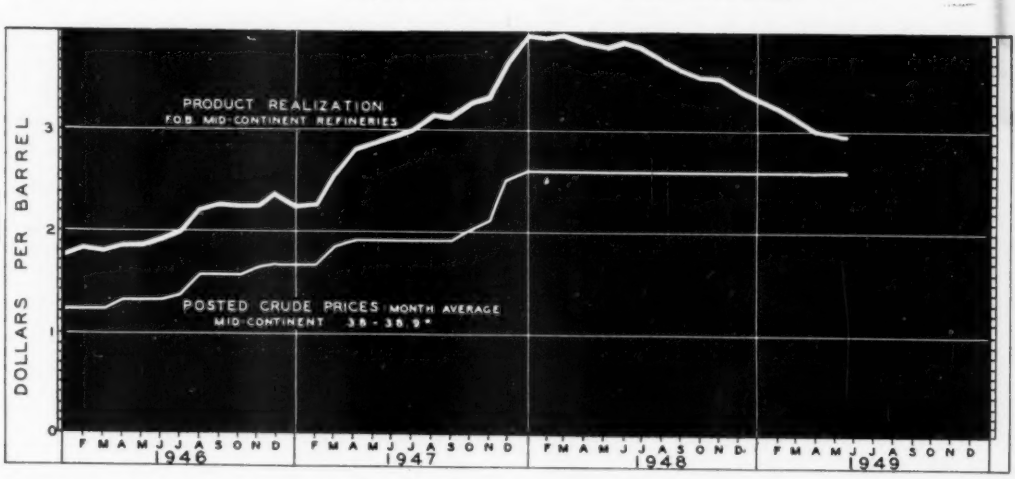
150-160 vis., D bright stock, 0-10 pp.	19
200 vis., No. 3 neutral, 0-10 pp.	12-14

Western Pennsylvania

144-155 vis. 10 p.t. bright stock	21.5
180 vis., 0 p.t. neutral	20.5

CRUDE-SCALE WAX
Mid-Continent

132-134 A.M.P.	4.75


PRODUCT REALIZATION
F.O.B. MID-CONTINENT REFINERIES
POSTED CRUDE PRICES 1 MONTH AVERAGE
MID-CONTINENT 35 - 35.9°
DOLLARS PER BARREL
0
1
2
3
F M A M J J A S O N D
1946
F M A M J J A S O N D
1947
F M A M J J A S O N D
1948
F M A M J J A S O N D
1949

The above chart is based on posted price for 38°-gravity crude and representative refinery yields which are confined to gasoline, kerosine, distillate, and residual fuel oil. Refinery prices used are the average of Group 3 quotations as published in The Oil and Gas Journal

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EQUIPMENT MEN ... in the News

Kelco Appoints Jarvis and Lamkin as Representatives

H. R. JARVIS

M. A. LAMKIN

Ben F. Kelley Co., Tulsa, manufacturers of KelCo safety catheads, and other drilling equipment, announces the appointment of Harold R. Jarvis as its Illinois representative, located in Marietta. Jarvis was formerly with Dragon Manufacturing Co.

Covering the Gulf Coast area for Kelley is Mark A. Lamkin of Houston. Before joining Kelley, Lamkin was associated with Emsco Derrick & Equipment Co., Nowery J. Smith Supply Co., Maloney Tank Co., and Union Tank & Supply Co. Ed W. Plaugher, Allan Nelson, and Lamkin, all representatives of KelCo., have spent the last few days in the Mid-Continent area.

Amos Johnson Joins Stoody Sales Co.

Amos Johnson, well known in the welding industry of the Northwest, has recently joined the field sales department of Stoody Co., manufacturers of hard-facing alloys.

Johnson has been assigned to assist Stoody distributors in Minnesota and the Dakotas. His home is in Minneapolis.

Dow Chemical Adds Three New Members to Board

N. R. Crawford, president of Dow Chemical of Canada, Ltd., has announced the addition of three new members to the firm's board of directors and two changes in its officers. This action fills the board vacancy created by the death of Dr. Willard H. Dow and expands membership of the board from six to eight.

New board members are Calvin A. Campbell, Donald Williams, and Ralph M. Hunter. All three men hold key positions with Dow Chemical Co., of which Dow Chemical of Canada is a subsidiary. In the parent company Campbell is secretary and general counsel; Williams is director of sales; and Hunter is manager of the electrochemicals division. Concurrently Williams was elected a vice president of the Canadian company and Campbell was elected secretary to replace Leland I. Doan who resigned the post in view of his recent election to the presidency of the parent company. Other members of the board are: Doan, Crawford, Earl W. Bennett, Dr. Ray H. Boundy, and Leroy D. Smithers.

Griffin and Rubac Boosted By American Iron & Machine

American Iron & Machine Works Co. has announced the appointment of Charles L. Griffin as assistant sales manager. Griffin has been with the company 2 years and was formerly sales engineer. He started in the oil industry as a roughneck in 1931 and subsequently was an organizer and shop foreman of Jeddy D. Nixon Co. He was Mid-Continent engineer for Reed Roller Bit Co. for 5 years.

C. L. GRIFFIN

E. E. RUBAC

Elmer E. Rubac has been made assistant to M. G. McCool, general manager of the company. Rubac will be in charge of advertising, Oklahoma City sales office, warehouse and shipping department, as well as coordinator among all departments at the main plant in Oklahoma City.

Bethlehem Opens New Store at Snyder, Tex.

Bethlehem Supply Co. announces the June 1 opening of a new and modern oil-field supply store at Snyder, Tex. The Snyder store will carry a full stock of oil-field drilling and production equipment required to meet the needs of the oil industry in that vicinity. Competent and sufficient personnel will be available in and through this store to give immediate service.

Geiler Elected President Of A. R. Maas Chemical

R. L. GEILER

At the last board of directors' meeting of the A. R. Maas Chemical Co., South Gate, Calif., Raymond L. Geiler was appointed president to succeed Holger Stougaard who passed away March 27. Thomas F. Edson was elected to succeed Geiler as executive vice president and Fred C. Bowman, director of research, was appointed vice president.

Geiler began his career with the company in 1934. In 1937 he became purchasing agent and in 1939 was appointed sales manager. He was elected executive vice president in 1946 and held this position until his recent appointment as president.

Edson entered the employ of the company in 1936 as an engineer. He was appointed plant superintendent in 1939 and elected vice president in 1946. Bowman joined the staff of Maas Laboratories in 1929 as chemical engineer. He soon became director of Maas Laboratories as well as director of the laboratories at the chemical company, and when the research department of the A. R. Maas Chemical Co. was established, Bowman was appointed director of research, which office he still holds.

Rawson Elected President Of Houston Engineers Club

W. Brant Rawson, vice president and director of Maintenance Engineering Corp. of Houston, has been elected president of Houston Engineers Club for 1 year. Membership of this group is made up of all the various technical, engineering, and associated groups in the Houston territory.

Rawson, who is also active in Texas Society of Professional Engineers and Houston Instrument Society, has lived in Houston for 29 years. He joined Maintenance Engineering 22 years ago. He is a 1926 graduate of Rice In-

(Continued on page 135)

Classified Advertising

The Market Place for the Oil Industry

UNDISPLAYED

All ads, 12 cents a word. Minimum charge, $3.00 per insertion.
Centered Line, any ad, $1.00.
Box Numbers count 9 words when replies are to be sent to our Tulsa Office. Replies forwarded without charge.

DISPLAYED, PER INCH

$12.00 per column inch per insertion. One-point border and 12-point capitals are allowed. Larger type sizes not accepted.

All classified advertising payable in advance.
10% Discount if 3 insertions are ordered at one time.
COPY DEADLINE, 9:00 a.m. Monday prior to each week's issue.

THE OIL AND GAS JOURNAL
P. O. Box 1260, TULSA, OKLAHOMA

EQUIPMENT FOR SALE

FOR SALE: Near Wynona, Oklahoma, 32'x96'x10' Sectional Steel Corrugated Iron Building now erected. $1500.00. Cities Service Oil Co., Patridge, Bartlesville, Okla.

FRANKS double drum model 5000 spudder, excellent condition. Mast, lines, tools, dog house, light plant, butane tank. Complete and ready to go. Gleason Drilling Co., Russell, Kansas.

FOR SALE—Franks Model FA with automatic chuck, complete with watertruck and all equipment. Mounted on late 2-ton trucks. Due to other interest will sell very reasonable. Box C-913, The Oil and Gas Journal, Tulsa, Oklahoma.

EQUIPMENT FOR SALE

FOR SALE: Model "K" Cardwell, single drum draw works powered by G.A.K. Waukesha engine. Equipped with 98' "A" mast and sub skid. Priced for quick sale. Terms. Melton Supply Co., Seminole, Okla.

SAVE WITH SAFETY—Very Good Used Wire Line—Any Size or Length up to 5,000' —Respooled for Your Inspection — Cable Tools for Sale. General Tool & Supply Co., P.O. Box 4387, Phone 61335, Oklahoma City, Okla.

COMPLETE GENERATING PLANT
Two NT 128-BHP vertical natural gas engines and one 48-BHP, driving two GE 75-KW, 3-phase, 4-wire 120/208 volt, 60-cycle generators and one 30-KW, 3-phase generator respectively. Complete with switchboards and auxiliary equipment. Running and in good condition. Public Market, 311 So. Klein, Okla. City, Okla.

BLOWOUT PREVENTER—10" Hinderliter type D.U. 4-M, 4½" rams, 6,000 lb. Year old, used 45 days—$1500. Shaleshaker, Thompson Model SR. Less sample machine. Used 30 days—$550.00. Midwestern Drillers, 816 North Grant, Liberal, Kansas. Phone 960.

FOR SALE: 100 hp. Allis-Chalmers electric motor, explosion proof, slip ring, new unused 3 hp., 500 v., 50 cy., 585 rpm., or 550 v., 60 cy., 700 rpm. $1800.00 f.o.b., Portland, Ore., A. Eckley, 1709 24th Ave., Longview, Wash.

ROTARY equipment, almost new, only used few days, 1800' PK rods, Drill collar 30'x4¼" with 3½" box, King water swivel 1¼". PK slips, hoisting plugs, overshot. Complete outfit $4500, or will divide. We handle new and used spudders, rotaries, core drills, pipe, tools, cable. Fishing tools and equipment rented. Pressey & Son, Pueblo, Colo.

EQUIPMENT FOR SALE

FOR CABLE TOOLS
DEGEN PIPE AND SUPPLY CO.
Box 107, Red Fork Station, Tulsa, Oklahoma

FOR SALE: 1 new patented Tom Dietle all steel, heavy duty casing pulling machine, 10" x 55' "A" mast—Double Drum—Double brake spudding attachment for ripping casing. I.H.C. motor, fully equipped, starter, 4-speed power transmission, also tools. Located Eureka, Kansas. Phone 1032. 917 North Elm or Tulsa: 2136 So. Yorktown. Phone 2-0061.

FOR SALE: Wilson Giant draw works, powered by 2—J.L.-1335 Buda engines and Wilson chain compound. Like new condition, with bargain price. Terms. Melton Supply Co., Seminole, Okla.

ONE Army surplus Buda M. O. 893, six cylinder engine with skid complete, $1,750.00 F.O.B. Houston, W. H. Orr, A 8-6064; #15 Japhet Street, Houston 10, Texas.

FOR SALE: Fifty, Sixty, and Eighty Thousand barrel tanks, good condition, knocked down or erected on your locations at attractive prices. Atlas Tank & Steel Company, Tulsa, Oklahoma.

FOR SALE: Sullivan #200, 1945 model, mounted on 1941 White truck. Rig in excellent condition, but drill pipe poor. Sale price $13,000. Phone 377-W, 932 Edwards, Midland, Texas.

STEEL PIPE

1300 ft.—5½" with couplings
Located Chicago.
Invite rigid inspection

DONALD B. MAC NEAL, Inc.
12100 S. Loomis St. Chicago 43, Ill.
Pullman 5-3411

FOR SALE

12—230 H.P. Type 10 Bessemer New 17" Power Cylinders complete ready to run with 16" to 18" Compressors. 1—230 H.P. Clark Horizontal with Compressors. Located Salem, Illinois.

ENGLE PETROLEUM, Incorporated
Box 455, Evansville, Indiana

FOR SALE

Practically New Bethlehem S-40 Pulling Unit complete with all equipment, powered with 145-GKU Waukesha Engine—Bargain.

C. L. McMAHON, INC.
1605 National Bank of Tulsa Bldg.
Tulsa, Oklahoma

COMPLETELY EQUIPPED

NEW HERCULES RXC
Gasoline Engines

Price of engines, with full equipment, is $1250 . . . less than usual cost of engine alone! PROMPT SERVICE IS ASSURED THROUGH NATIONAL FIELD ORGANIZATION.

Engine rating, 110 H.P. at 1800 r.p.m. Equipment includes: cast iron radiator; starter; Twin Disc clutch power take-off; heavy metal housing; all power controls; etc.

Wire or write
Box C-945, The Oil and Gas Journal, Tulsa, Oklahoma

FOR SALE

NEW CASING AND LINE PIPE

25,000' 5½" 15½# 8RT J55 R2 API Smls. Casing
15,000' 7" 23# 8RT J55 R2 API Smls. Casing
6,000' 8⅝" 28# 8RT J55 R2 API Smls. Casing
4,841' 9⅝" 36# 8RT J55 R2 API Smls. Casing
7,015' 10¾" 40½# 8RT J55 R2 API Smls. Casing
19,000' (893 Joints) 6" Std. Byer's Wrought Iron L.W. Plain End Pipe (ASTM A72-33)

Above subject to prior sale.

THE NATIONAL COOPERATIVE REFINERY ASSOCIATION
P.O. Box 770 McPherson, Kansas
Phone 820

SOME MORE PIPE FOR SALE!

8⅝" OD 24 lb. Used Lap Weld Casing T & C
7" OD 20 lb. Used Lap Weld Casing T & C
7" OD 17 lb. Used Lap Welding Casing T & C
5½" OD 15 lb. Used Lap Weld Casing T & C
5½" OD 13 lb. Used Lap Weld Casing T & C
2⅜" OD 4.60 lb. Upset Lap Weld Tubing
2" Regular Used Lap Weld Line Pipe

AVAILABLE FOR IMMEDIATE SHIPMENT

*Located in Charleston, W. Va., area. *All in A-1 Condition.

For complete information and prices contact the following:

OKMULGEE SUPPLY CORPORATION
Okmulgee, Oklahoma

RIGHTWAY PIPE & SUPPLY CO.
Alice, Texas

SAN ANTONIO PIPE & SUPPLY CO.
1735 South Alamo St.
San Antonio, Texas

MAX G. WEINER CO.
1401 Centennial St.
McKeesport, Pa.

FOR SALE

One (1) new fractionating tower, 5'-0" I.D. X 89'-6" over-all height X 1⅛" plate. Thirty-four (34) bubble trays, ten (10) 18"-300# manways. Stress relieved and built in accordance with API-ASME Code for 350 PSI working pressure.

One (1) new horizontal reflux drum, 5'-6" I.D. X 18'-6" over-all length x 1⅞" plate. Stress relieved and built in accordance with API-ASME Code for 350 PSI working pressure.

ROCK ISLAND OIL & REFINING CO., INC.
335 West Lewis St. Wichita, Kansas
Phone 7-3325

EQUIPMENT FOR SALE

FOR SALE: 10,000 ft. 20" OD x ¼" Wall New Electric Weld Steel Pipe, Double Random Lengths; 50,000 ft. 18" OD x ¼" Wall Used Steel Pipe, Single Random Lengths. Utility & Industrial Supply Company, 921 Michigan Ave., E., Jackson, Michigan.

SPECIAL OFFER! Truck mounted portable rotary drilling rig, detailed information upon request. Priced for quick sale. Mechanical Equipment Co., 851 Carondelet Street, New Orleans, La.

FOR SALE: 6 Fairbanks-Morse ZC-118 engines, all in first-class condition. Lahoma Oil Corporation, 619 Leonhardt Building, Phone 7-1211, Oklahoma City.

FOR SALE: Insley K-12 Back hoe, same as new, only five months old. If interested call: Paul Haines, Jacksboro, Texas, Phone 8 or at Marion, Kansas, 478-J.

NEW CENTRIFUGAL PUMPS

Byron Jackson—Aurora—Lombard—Gould —Hale — Gorman Rupp — Wayne & Novo, complete with engine power, also 1½ to 20 KW light plants. H. A. McCarthy, 310 Thompson Building, Tulsa, Oklahoma.

FOR SALE: Wilson Super Spudder—Double drum, double pole mast, complete with walk ways, roof, wings, and fully skidded—Good Wire—Priced to sell. Wilson Mogul Drawworks, powered by 145 GK Waukesha—Portable derrick—Wilson Snyder 6 x 16 pump, powered by WAK Waukesha—4½" Drill Pipe, Traveling Block, Swivel, 4¼" x 40' Kelly, BJ Tongs, etc.—Priced to sell. Write: T & R Oil Field Machine & Supply Co., Box 98, Carmi, Ill.

FOR SALE: 32,000 feet of 16" A. O. Smith used pipe, ¼" wall thickness. Cleaned inside and out. Located in Northern Kansas. L-B-W Development Company, Inc., McPherson, Kansas. Phone 163.

FOR SALE: Double drum heavy duty spudder, 6500 foot capacity, with telescoping mast with roller bearing sheaves, all mounted on steel skid. All tools for 7" and 5" casing. Kohler light plant, unitized forge on skid, large skid rack for moving all tools. Machine and tools in excellent shape. Everything rigged for quick moving. Ready to put to work. Price $12,500.00. Box C-857, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE: Heavy duty Cardwell rod and tubing unit with single pole telescope mast, mounted on Diamond-T truck with rod and tubing tools. Harry L. Williams, Lost Springs, Kansas.

3,110,000 GAL. CAP. STEEL TANK

STEEL ROOF—LIKE NEW

Price Immediate Sale $6950.00

Box C-939, The Oil and Gas Journal, Tulsa, Okla.

MANUFACTURERS LATEST DESIGN

Hydraulic Casing Pulling Units. Complete line of equipment. Units made to your specifications. Truck Mountings or Skid Units. Repair Service and Parts.

OKLAHOMA MACHINE & SUPPLY CO.
Ada, Oklahoma

PACKAGED H_2S REMOVAL UNITS

We offer prompt shipment on skid-mounted hydrogen sulfide removal units for treating sour gas for pipe line or fuel gas purposes.

GRAFF ENGINEERING & EQ'PT. CO.
3415 Westminster, Dallas 5, Texas

TANKS—TANK CARS
NEW LOW PRICES

2—74,000 Bbl. Steel Tanks, Like New
2—10,000, 3—1,000 and 3—65 Bbl. API New Bolted Tanks
80—8,000 and 10,000 Gal. Cap. Tank Cars

THE DARIEN CORPORATION
60 E. 42nd St. N.Y. 17, N.Y.

EQUIPMENT FOR SALE

FOR SALE: 11-24" Merco Fig. 4449 Plug Valves, New. Michigan Gas Storage Company, P.O. Box 729, Jackson, Mich.

CASING AND LINE PIPE END USERS

If interested please state wants. W. F. Plagenz, 502 Park Bldg., Cleveland 14, Ohio.

FOR SALE: At Houston 27 miles 6" 12.98# DRL used Line Pipe beveled. All or any part. Cities Service Oil Co., Patridge, Bartlesville, Okla.

FOR SALE: Rotary Mast Pole. 1—8" x 10" x 87' Two Leg Mast Pole with 5—24" Roller bearing sheaves in crown. 98'—¾" Raising Line and 110'—1" Telescope line. 1200'—9/16" Guywires and 160'—⅞" Guywire. 1—4000' Double Board. 1—30' Main Skid with upright supports for Mast and well for Rotary table. Denman Drilling Company, Phone 4553, Wichita Falls, Texas.

FOR SALE: 1—10¾" SDA Cameron Blowout Preventer—4,000# Test with 4½" and 3½" Rams. 1—10¾" SDA Cameron Master Valve 4,000# test. 1—10¾" Regan Pressure Operated Blow-out Preventer—6,000" test. 1—Fluid End for 7¼ x 14P Oilwell Pump. 2—Thompson SRF Shale Shakers. 1—Link-Belt Shale Shaker powered by Wisconsin Motor. 2—Basch-Ross 2RBS4—RB4½" Kelley Drives. 1—6,000' Measuring line with Reel. 1—C-36 Chrysler Industrial Engine—Skid Mounted. 1—Brewster Coring or Swabbing Unit. 10,500' Capacity 9/16, Powered by 6MZR Waukesha Motor. 1—4½" x 41' Basch-Ross Square Kelley with Rathole—Actually Drilled 19,000' hole. 2,985'—4½" O.D. 16.60# Drill Pipe with Hughes Acme F.H. Joints Regular. Box and Pins all in good condition. 3,868'—4" O.D. 15.70# Drill Pipe with Hughes 5¾" API F.H. Joints, Bottle-Neck. Actually Drilled 16,000' of hole. 3—30' x 6¼" Basch-Ross Drill Collars with Safety Clamps, Slips & Subs—Actually Drilled 19,000' of hole. 1—Conventional Core Barrel. 1—American Overshot and Slips. 1—Set 4½" Web-Wilson Elevators. Most of these items were purchased new slightly more than a year ago. Will sell any portion or trade equitably for good used Lee C. Moore Cantilever Derrick with Sub-Structures, power pump, medium size power drawworks, pulling unit, etc. Better deal cash for all. Sale of all items subject to prior consideration.

WILLIAMS DRILLING COMPANY
P.O. Box 772, BATON ROUGE, LOUISIANA
PHONES 3-1901 or 4-4354
NIGHT PHONE 2-3086

Several Army Surplus 4½" x 6" Gaso Duplex 1880 Pumps—two piece skid mounted with Chrysler 8 cylinder engines. Will sell pumps only or complete units about half price.

H. H. COFFIELD
ATTN: W. H. Orr
Phones: 132—Rockdale, Texas
A-86064—Houston, Texas

2" LINE PIPE

125,000 Ft.

Excellent Condition

PRICED TO SELL

Write—Wire—Phone

THE INTERSTATE PIPE & SUPPLY CO.

Marietta, Ohio

Ph. 2468

EQUIPMENT WANTED

WANTED: One 8x12 or 7x12 Ingersoll-Rand Type XRB or XOB Compressor Cylinder assembly. Complete. Wire price, serial number and condition: Earl E. Knox Company, Erie, Pennsylvania.

WANTED: 4 miles each 6" O.D. and 4" O.D. invasion pipe; also desire victaulic couplings. Box C-938, The Oil and Gas Journal, Tulsa, Oklahoma.

HELP WANTED

ENGINEERS, Executives, Technical Men: Salaried positions—$3600 to $30,000. This confidential service for outstanding men who desire a change of connection, will develop and conduct preliminary negotiations without risk to present position. Send name and address for details. Tomsett Associates, 1204 Berger Bldg., Pittsburgh 19, Pa.

WANTED: Chemical Plant Manager—to have complete charge of medium size process production petroleum chemical manufacturing. Chemical engineering training desirable. Must have previous experience in process piping. Age 30 to 40 years. Excellent opportunity for man with supervisory ability, able to handle responsibility. Plant located in Chicago area. Box C-935, The Oil and Gas Journal, Tulsa, Oklahoma.

ENGINEERS WANTED

PROJECT ENGINEER experienced in correlating the engineering of gasoline plants and natural gas compressor stations. DESIGN ENGINEER experienced in the layout and design of petroleum refineries. Kansas City location. State qualifications. Box C-946, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED

EXPERIENCED PETROLEUM ENGINEER

Specializing in study of OIL and GAS RESERVES. To head reserve section large independent oil company. Location, Tulsa, Oklahoma. Give full particulars as to personal history, academic qualifications, practical experience, references, and salary expected. All communications confidential.

Box C-933, The Oil and Gas Journal, Tulsa, Oklahoma

TECHNICAL SERVICE DIRECTOR

A large Chemical Corporation producing industrial chemicals wants experienced man for this position. Must have chemical education in addition to at least ten years experience in sales and service work with initiative and ability to relieve executive officer of responsibilities concerned with technical service administration and customer development. Salary commensurate with responsibility and excellent opportunity for further advancement in an aggressive growing organization.

Box C-931, The Oil and Gas Journal, Tulsa, Oklahoma

ENGINEERING

During the next several months we will increase our Engineering Organization engaged in the design of Oil Refinery Plants and Power Plants. Location Cleveland, Ohio. The men we need should be qualified as draftsmen, designers, checkers or in higher engineering skills on design of piping, instrumentation, pressure vessels, structural steel, concrete, mechanical or electrical. For presenting your qualifications and prompt consideration, write to us for application form.

ARTHUR G. McKEE & CO.
2300 Chester Ave., Cleveland 1, Ohio

HELP WANTED

NEW Directory of 140 large oil companies in U.S. 10 of them having foreign operations, showing where to apply for jobs. Price $5.00 postpaid. Oil Industry Mailing List, Box 2603, Tulsa, Okla. (our 29th year).

SITUATIONS WANTED

GRADUATE ENGINEER

Thirteen years graduated, all-round oil field experience. Four years supervisory and administrative in drilling and production. Linguist. Age 35. Desire connection domestic or foreign, $9,000 minimum base. Box C-852, The Oil and Gas Journal, Tulsa, Oklahoma.

EXECUTIVE desires affiliation with a major oil company. Graduate Chemist, M.S. Petroleum Engineering, 20 years experience, 18 years gasoline testing lab. manager. Qualified for: Public Relations, Sales Promotion, Employee Training, Advertising Layout and Aptitudes. Box C-925, The Oil and Gas Journal, Tulsa, Oklahoma.

CONTROLLER-TREASURER

Experience with independent oil company in production, refining, marketing accounting, taxes and finance; presently employed; desire change. Box C-885, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST: Broad experience, 42 years of age, now employed in South America, desires connection with independent company, preferably in Mid-Continent area. Box C-940, The Oil and Gas Journal, Tulsa, Oklahoma.

ACCOUNTANT, oil producing and drilling accounting experience, two years as Internal Revenue Agent, B.B.A., C.P.A., age 31, desires position as head accountant tax man office manager for independent operator or drilling contractor. Prefer Houston area. Box C-932, The Oil and Gas Journal, Tulsa, Oklahoma.

REFINERY MANAGER: M. S. in Ch. E., age 35, registered Texas engineer, thorough knowledge refining, now manager small Texas refinery. Desire new connection. Available short notice. Box C-930, The Oil and Gas Journal, Tulsa, Oklahoma.

SALES REPRESENTATIVE: 40 years old. Graduate Petroleum Engineer. Good record of achievement. Well known to Oil Circles on the Gulf Coast and in Southwest Texas. 15 years experience engineering and managing Sales direct and through distributors to the Production, Drilling, Pipe Line and Natural Gas and Gasoline Industries. Live in San Antonio prefer to headquarter there and work Southwest Texas. Available immediately. Can furnish top flight references. Box C-922, The Oil and Gas Journal, Tulsa, Oklahoma.

LANDMAN—Ten years Kansas and Oklahoma experience in independent producer's district office. Working knowledge of office procedure and accounting. Good references. Box C-926, The Oil and Gas Journal, Tulsa, Oklahoma.

SENIOR PETROLEUM ENGINEER: Now in semi-executive position major oil company with wide experience in all phases petroleum engineering, geology, well completions, and supervisor of field operations. Age 38. Desires opportunity with smaller producing company. Record on request. Box C-927, The Oil and Gas Journal, Tulsa, Oklahoma.

EXECUTIVES ATTENTION: If you need a man of excellent legal background with broad land, exploration and production experience write Box C-936, The Oil and Gas Journal, Tulsa, Oklahoma.

LANDMAN: Diversified experience in Gulf Coast, West Texas, Rockies and Canada. Legal background. Box C-937, The Oil and Gas Journal, Tulsa, Oklahoma.

SERVICES

PECOS DRILLING COMPANY, INC.
DRILLING CONTRACTORS "Cable Tools"
302 CARPER BUILDING, TELEPHONE 649
ARTESIA, NEW MEXICO

OIL PRODUCTION LOANS
Applications for oil production loans invited from qualified producers. Give full information in first letter. Box C-934, The Oil and Gas Journal, Tulsa, Oklahoma.

ROYALTIES

DEEDED ROYALTIES
San Juan Basin & Permian Basin. Write Harry S. Wright, Wright Bldg., Farmington, New Mexico.

WILL BUY FEE LANDS, producing royalties or mineral prospects. Submit offerings in detail to Box 546, Thibodaux, Louisiana.

ROYALTIES IN HOT AREAS!
Recent strikes have focused attention on Montana's deeper oil zones and major companies are moving fast, drilling and leasing. We buy direct in the field, sell direct to our customers. Write LANDOWNERS ROYALTIES COMPANY, Box 1225, Great Falls, Montana.

LEASE AND DRILLING BLOCKS

CHOICE Drilling Blocks to deal to responsible parties, moderate drilling depths, in Western Nebraska and Eastern Wyoming. Kimball Development Co., P.O. Box 1002, Kimball, Nebraska.

FOR SALE: Oil and gas leases, five hundred acres, near new production Busseron Township, Knox County, Indiana, other leases and royalties. Lindsay & Sampson, 519 American Bank Bldg., Vincennes, Indiana.

OIL LEASES for sale in large, small or medium size blocks in Colorado, Wyoming, New Mexico, Montana, Arizona. Wholesale or retail. Write for descriptive list. Dyer-OJ. 1835 Champa, Denver, Colorado.

SETTLED Production: Approximately 560 acres, 36 producing wells, approximately 60 bbl. per day, all Bartlesville sand wells. Box C-917, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE: Oil and Gas Leases and drilling propositions in shallow territory of Allen, Simpson, and Warren Counties, Kentucky. W. P. Harley, Bowling Green, Ky.

FOR LEASE for oil and gas—acreage in Brazoria County near Angleton, Texas. Write E. Hufford, Box 633, Boulder City, Nevada.

SOUTHEASTERN NEW MEXICO: For Sale—Oil lezses and royalties in North Lea and Eastern Chaves Counties. Grant Keyes, 311 White Bldg., Roswell, New Mexico.

MONTGOMERY COUNTY, MISSISSIPPI, on the ideal shoreline structure, where the sands are thicker and much more favorable for petroleum accumulation. 145 acres on SEISMOGRAPH HIGH adjoining Highway and Railroad 31-19-7 on DOME outstanding Kilmichael structure. Four sands to 3,500 feet. If no oil will deed you land. Opportunity: 1369 Court, Memphis, Tennessee.

LEASES ROYALTIES
PRODUCING OR NONPRODUCING
Texas, New Mexico, Oklahoma, Louisiana and Illinois
Inquiries Invited
B. D. BUCKLEY
60 Broadview Drive, Clayton (5), St. Louis, Missouri

NEW MEXICO OIL
LEASE AND ROYALTY BUYERS

CROSS ROADS: 100 royalty acres under production and adjacent thereto $1200 p.a. subject. NW 3 & 4 miles leases at $130 p.a. NW 20m 200a in Major Co. play $20 p.a. Further NW of Cross Roads any part 400a same (100' & 200') contour as Major leases $12 p.a. Well under contract 6000' cutting all potential oil zones down to Upper Pennsylvania, Major Co. support. Our extensive engineering experience and unbiased reports available to those interested in leases or royalty under Major Co. operations in these important oil areas.

W. J. PETERMAN, GEOLOGIST
Portales, New Mexico

LEASE AND DRILLING BLOCKS

WE BUY Salvage Oil Properties and small production. Ben H. Rosenthal, 1901 Republic Bank Bldg., Dallas, Texas.

PATENT ATTORNEYS

PATENT Practice before U. S. Patent Office. Validity and Infringement Investigations and Opinions. Booklet and form "Evidence of Conception" forwarded upon request. Lancaster, Allwine & Rommell, Registered Patent Attorneys, Suite 418, 815-15th Street, N.W., Washington 5, D. C.

WANTED

GASOLINE Connection Wanted: Wish to contract for six million gallons a month for 1 year at market price. No brokers. Will deal with principals only. P.O. Box 481, Beaumont, Texas.

LEGAL BLANKS

BURKHART LEGAL BLANKS since 1908. Oil-Gas (all states), Business, Real Estate, Legal Forms, Leases, Revised With Government Regulations, Commercial Printing, Catalog and Samples on request. Burkhart Printing & Stationery Company, 115 South Cincinnati, Tulsa 3, Oklahoma.

REAL ESTATE

FOR SALE
SIX 25-FT. SHERMAN LOTS
Separate or together; Business corner. County Court House 1½ blocks. Oil production 2 miles. Write Hattie B. Kimball, Jones at Elm, Sherman, Texas.

FOR SALE

FOR SALE: 455 ft. IDECO Radio Tower. Ideal for most FM communications. Will sell at a real saving. Boyd Kelley, KTRN, Wichita Falls, Texas.

ALUMINUM PAINT — 400 5-gallon cans, 480 quarts—Exterior Gilsonite Base, Highly Polished Pure Aluminum Pigment. Waterproof, ideal for tanks, roofs, buildings, equipment. Covers 300 to 400 square feet to the gallon. Distributors Liquidation. Regular price $6.95 gallon. Take any part—$10.00 for 5 gallons, $7 for 12 quarts. Send Check With Order. The National, 606 Walnut, Kansas City, Mo.

FOR SALE OR CHARTER

Boat 65 ft. by 18 ft.; 165 G.M. Diesel; wood; rigged nicely for geophysical exploration work; approximately 1,000 gallons fresh water; Koehler electric plants; refrigerator and deep freezer; innerspring mattresses; awning over working area aft. Vessel and equipment slightly over a year old. Worked since completion as survey boat for oil company engaged in geophysical exploration work in Gulf.

Also other boat suitable for offshore exploration work.

H. P. McHUGH
Morgan City, Louisiana

SMALLEST, prettiest Miniature Tri-Cone Rock Bit made. Less than one-half inch diameter. Cones turn. Gold or nickel plate. On tie chain clasps, strap type for watch fobs and ring type for charms.

Nickel plate $4.00
Gold plate $4.50

Money Order or C.O.D.
H. McGAUGHEY
P.O. Box 11063, Houston, Texas

EQUIPMENT MEN

Continued from page 131)

stitute and was a student engineer at General Electric Co.'s Lynn, Mass., course during 1926 and 1927. Pryor to his election as president, Rawson has been treasurer of Houston Engineers Club since 1947.

Esco Announces New Metallurgical Chief

James T. Gow has joined Electric Steel Foundry Co., Portland, Ore., producers of steel castings and specialty equipment.

As chief metallurgist for the company's operations, he will have complete charge of all phases of the foundry's metallurgical department, covering sand control, chemical control, physical testing, radiographic inspection, case studies, melting, and pouring, field calls and assistance, and research.

Herrick Describes Middle East to Tulsa Nomads

James Herrick, vice president in charge of export advertising and sales promotion, Cardwell Manufacturing Co., was guest speaker at the May 20 luncheon of the Tulsa Nomads, held at the Hotel Tulsa.

Herrick described his visits to the oil fields of the Middle East as a representative of his company. His talk was illustrated with numerous pictures taken of the active oil areas of the Middle East.

Don Davis Opens Fort Worth Sales Office

Don Davis, who has sold oil-field equipment for several years, and who for the last 5 years has been associated with Rector Oil Well Equipment Co., has announced the opening of an office in the Fort Worth National Bank Building, Fort Worth, where he will serve as a manufacturers' agent for a number of oil-field-equipment manufacturers. Among other lines, he will handle some Rector products.

Cardwell Shifts Toben From Casper to Denver

Al Toben, Rocky Mountain area sales representative for Cardwell Manufacturing Co., Inc., formerly making his headquarters at Casper, Wyo., has now moved to Denver.

Toben will continue to travel through all of the Rocky Mountain area, contacting drilling contractors, servicing contractors, and oil producers selling Cardwell rigs. Cardwell parts will continue to be available at Casper, through Western Oil Tool Co.

Link-Belt Promotes Craig, Perry, Kolar, and Riley

Allan Craig, sales manager of the Link-Belt Co.'s southeastern division since 1945, with headquarters in Atlanta, is being transferred to Houston in the capacity of general manager of the southwestern division, where a new Link-Belt plant is about to be opened.

CRAIG

PERRY

KOLAR

RILEY

Michael J. Perry, district manager at Moline, Ill., since 1946, has been appointed sales manager, southeastern division, with headquarters at the Atlanta plant, to succeed Craig in that capacity. Andrew K. Kolar, district sales engineer at Moline since 1947, has been appointed district manager, in full charge of the office.

John D. Riley has been appointed district manager at Newark, N. J., to succeed George E. Ramsden who died on April 10. The Newark office has expanded its forces and moved to larger, more convenient quarters at 212 Essex Building, 31 Clinton Street.

F. E. Rath Made Works Manager for Spang

Spang & Co., manufacturers of cable-system drilling tools, have announced the appointment of Frank E. Rath as works manager. Rath comes to the Spang organization from Carnegie-Illinois Steel Corp., having been chief engineer of the Duquesne Works of that company.

He had previously been employed in the research department of Carnegie-Illinois Steel and still earlier in research work for C. K. Williams & Co. of Easton, Pa. He is a graduate of Carnegie Institute of Technology in the department of engineering.

George to Manage Sales For Hooker in New York

William F. George, New York district sales supervisor since 1942, has been named New York district sales manager for Hooker Electrochemical Co. George will continue his headquarters at the New York office. He will devote his efforts to sales management for the downstate New York area, New York City, and northern New Jersey.

INDIANA

(Continued from page 109)

INDIANA

EVANSVILLE—A new pool for Pike County is being opened by W. R. White and associates in their 1 F. M. Neal, NW NW NW 13-1n-8w. Testing the Rosiclare limestone at 1,297-1,302 ft., the well is making 180 bbl. of oil per day on the pump following a 1,000-gal. acid treatment. The location is about 2 miles north of production of the Petersburg pool.

Ryan & Sharp 1 Elsie Lewis, SE SE NE 35-2s-12w, a mile south of the North Owensville pool, Gibson County, swabbed and flowed at the rate of 10 bbl. of oil an hour natural from the O'Hara limestone, in which casing was perforated at 2,478-88 ft. It is 2 miles northwest of Owensville.

In Posey County, B. M. Heath has completed his 1 S. L. Highman, SE SE SW 18-8s-13w, as a 165-bbl per day pumper from the McClosky lime. Completion is in three zones: 2,630-36 ft., 2,675-2,700 ft., and 2,704-16 ft. Location is 2 miles southeast of the Spencer pool.

G. H. Frodernman's discovery well, 1 Royse, NW NE SE 9-11n-9w, 3 miles west and north of the Springhill pool, Vigo County, has been completed on the pump for 60 bbl. of oil daily from the Devonian at 1,680-86 ft. and 1,690-1,710 ft.

INDIANA SUCCESSFUL WILDCATS

Posey County: B. M. Heath 1 S. L. Highman, SE SE SW 18-8s-13w, IP 165 bbl. per day, McClosky 2,630-36 ft., 2,675-2,700 ft., and 2,704-16 ft., TD 2,751 ft.

Vigo County: G. H. Frodernman 1 Royse, NW NE SE 9-11n-9w, IP 60 bbl., Devonian 1,680-86 ft. and 1,690-1,710 ft., TD 1,752 ft.

INDIANA WILDCAT FAILURES

Daviess County: Ernest Zink 1 P. Kavanaugh, NE SE SE 19-4n-5w, dry, TD 710 ft.

Gibson County: L. A. Messmer and Aurora Gasoline Co. 1 Morrison, NE SE NW 21-2s-10w, dry, TD 2,115 ft.

Carter Oil Co. 1 N. Kessel, NE NE NW 1-4s-11w, dry, TD 2,425 ft.

Pike County: Joe Reznik 1 T. J. Parker et al, SW SW SW 15-3s-8w, dry, TD 1,749 ft.

Posey County: Ashland Oil & Refining Co. et al 1 Roy Searcy, SW NW NE 16-6s-14w, dry, TD 2,942 ft.

I. W. Hartman 1 Herman Hoehen, NE SE NW 20-6s-14w, dry, TD 2,962 ft.

Vanderburgh County: Ralph Halbert 1 Browning, SE NW NW 18-6s-11w, dry, TD 2,328 ft.

Vigo County: G. H. Frodernman 1 Bland, SE NW SW 19-11n-8w, dry, TD 1,465 ft.

ADVERTISERS

Aerofin Corporation 116
Air Reduction 11
Allis-Chalmers 24, 25
American Brass Co., The 21
American Cable Division of American Chain & Cable Co., Inc. Inside Back Cover
American Iron & Machine Works 4
American Roller Bearing Co. 103
Armstrong Bros. Tool Co. 93
Aurora Pump Company 97
Baker Oil Tools, Inc. 35
Baldwin-Duckworth Division of Chain Belt Company 32
Barret, Inc., William M. 103
Bertsch Company, The 104
B G Corporation, The 64
Bodden & Dechy 9, 9
Bonney Forge & Tool Works 15
Boyd Co., Clarence L. 117
Brewster Company, Inc., The 19
Briggs Bituminous Composition Co. 85
Brown Fintube Company, The 18
Byron Jackson Co. Front Cover
Cameron Iron Works, Inc. 123
Catawissa Valve & Fittings Company 100
Charlie's Machine Works 92
Chicago Bridge & Iron Company 59
Cities Service Oil Co. 116
Classified Advertising 132, 133, 134, 135
Colorado Fuel and Iron Corporation, Wickwire Spencer Steel Division 16
Coody Bender Co., The 86
Croso Manufacturing Co., Inc., M. J. 85
Dean Brothers Pumps, Inc. 113
Detroit Diesel Engine Division 6
Dragon Mfg. Co. 108
Dresser Industries, Inc. 17, 115, 125
Dresser Manufacturing Division 125
du Pont 1
Fairbanks-Morse & Co. 2
Frontier Bronze Corporation 30
Fulton & Company, R. H. 82
Gaso Pump & Burner Mfg. Co. 14
General American Transportation Corporation 120
Grancell, I. H. 92
Gulf Coast Rent-A-Car-Truck Co. 108
Hewitt Rubber Division, Hewitt-Robins, Incorporated 26
Huey & Company, S. E. 84
Hughes Tool Co. Back Cover
International Derrick & Equipment Co. 31
International Harvester Co. 68
International Nickel Company, Inc., The 34
Jones & Laughlin Steel Corp. 67
Jones & Laughlin Supply Co. 99
Kellogg Co., The M. W. 80
Keuffel & Esser Co. 113
Kinzbach Tool Co., Inc. 130
Kobe, Incorporated 115
Koehring Company 22, 23
Larkin Packer Company, Inc. 78
Link-Belt Company 5
Lister-Blackstone, Inc. 100
Macwhyte Co. 3
Marley Company, Inc., The 7
McCord Corporation 88
McDonald Co., B. F. 108
Mechanical Manufacturing Co., Inc. 93
Metal Goods Corporation 29
Midwestern Engine & Equipment Co., Inc. 83
Midwest Piping & Supply Company, Inc. 87
Minneapolis-Honeywell Regulator Co., Belfield Valve Division 10
Mission Mfg. Co. 75
National Airoil Burner Co., The 89
National Aluminate Corp. 60
National Geophysical Company, Inc. 94
Oakite Products, Inc. 97
Oil Well Supply Co. 90
Oklahoma Contracting Co., Inc. 84
Paris Distributor, Inc., Henry H. 113
Parsons Company, Subsidiary of Koehring Company 23
Patterson-Ballagh Division of Byron Jackson Company 122
Pelican Well Tool & Supply Company 104
Penberthy Injector Co. 105
Perrault Brothers, Inc. 83
Pipeline Cleaners Co. 84
Pittsburgh Coke & Chemical Company 119
Pittsburgh Lectrodryer Corp. 27
Powers Regulator Co., The 89
Reed Roller Bit Company 107
Reilly Tar & Chemical Corp. 86
Republic Steel Corporation 12
Roebling's Sons Company, John A. 20
Ross-Martin Co. 104
Ryerson & Son, Inc., Joseph T. 77
SKF Industries, Inc. 13
Staats Co., William R. 101
Standard Oil Co. of California 28
Standard Pressed Steel Co. 89
Standco Brake Lining Co. 93
Sterling Machinery Corp. 88
Templeton, Kenly & Co. 93
Thompson-Hayward Chemical Co. 130
Tuboscope Inside Front Cover
U. S. Steel Corp. Subsidiaries 90
Universal Oil Products Co. 62, 63
University of Oklahoma Press 130
Wallace & Tiernan Products, Inc. 116
Wheatley Pump & Valve Mfr., Frank 117
Wickes Boiler Co., Division of The Wickes Corporation 110
Wickwire Spencer Steel Division of The Colorado Fuel and Iron Corporation 16
Williamson, Inc., T. D. 86

CALENDAR

May

American Petroleum Institute, Rocky Mountain district, Gladstone Hotel, Casper, Wyo., May 26-27.

Fourth Annual Short Course in Gas Technology, sponsored by Southern Gas Association, Texas A. & I. College, Kingsville, May 30-June 1.

June

Petroleum Equipment Supplier's Association, annual meeting, Broadmoor Hotel, Colorado Springs, Colo., June 5-7.

Society of Automotive Engineers, summer meeting, French Lick Springs Hotel, French Lick, Ind., June 5-10.

National Oil Scouts and Land Men's Association, annual meeting, Shamrock Hotel, Houston, June 9-11.

Western Petroleum Refiners Association, joint regional technical-industrial relations meeting, Broadview Hotel, Wichita, June 10.

Canadian Gas Association, annual convention, Bigwin Inn, Lake of Bays, Ont., Canada, June 16-20.

Pennsylvania Grade Crude Oil Association, annual meeting, Hotel William Penn, Pittsburgh, Pa., June 16-17.

American Society for Testing Materials, fifty-second annual meeting, Hotel Chalfonte Haddon Hall, Atlantic City, N. J., June 17-July 1.

Kentucky Oil & Gas Association, annual meeting, Hotel Lafayette, Hotel Phoenix, Lexington, Ky., June 23-24.

American Society for Testing Materials, fifty-second annual meeting, Chalfonte-Haddon Hall, Atlantic City, June 27-29.

American Society of Mechanical Engineers, semiannual meeting, University of California Extension Building, San Francisco, June 27-30.

August

United Nations Scientific Conference on the Conservation and Utilization of Resources, U. N. Interim Headquarters, Lake Success, N. Y., August 17-September 6.

September

Interstate Oil Compact Commission, summer quarterly meeting, Stanley Hotel, Estes Park, Colo., September 1-3.

Instrument Society of America, annual meeting and exhibit, Municipal Auditorium, St. Louis, September 12-16.

National Petroleum Association, Hotel Traymore, Atlantic City, N. J., September 14-16.

American Gas Association, annual convention, Chicago, September 17-20.

American Institute of Chemical Engineers, Mt. Royal Hotel, Montreal, September 18-20.

American Association of Oilwell Drilling Contractors, ninth annual meeting, Baker Hotel, Dallas, September 19-21.

National Butane-Propane Association, Jefferson Hotel, St. Louis, September 19-21.

Mid-Continent Oil and Gas Association, twenty-seventh annual convention, Louisiana-Arkansas division, Roosevelt Hotel, New Orleans, September 22-23.

American Institute of Mining and Metallurgical Engineers, regional meeting, Neil House, Columbus, Ohio, September 25-28.

American Society of Mechanical Engineers, fall meeting, Erie, Pa., September 26-30.

October

American Society of Mechanical Engineers, petroleum division, 1949 Petroleum Mechanical Engineering Conference, Biltmore Hotel, Oklahoma City, October 2-5.

National Association of Corrosion Engineers, South-Central Regional Division, annual meeting, Adolphus Hotel, Dallas, October 3-4.

National Lubrication Grease Institute, Hotel Roosevelt, New Orleans, La., October 3-5.

American Institute of Mining & Metallurgical Engineers, Petroleum Branch, fall meeting, Plaza Hotel, San Antonio, October 5-7.

American Society for Testing Materials, first Pacific area national meeting, Hotel Fairmont, San Francisco, October 10.

Texas Mid-Continent Oil and Gas Association, annual meeting, Rice Hotel, Houston, October 13-14.

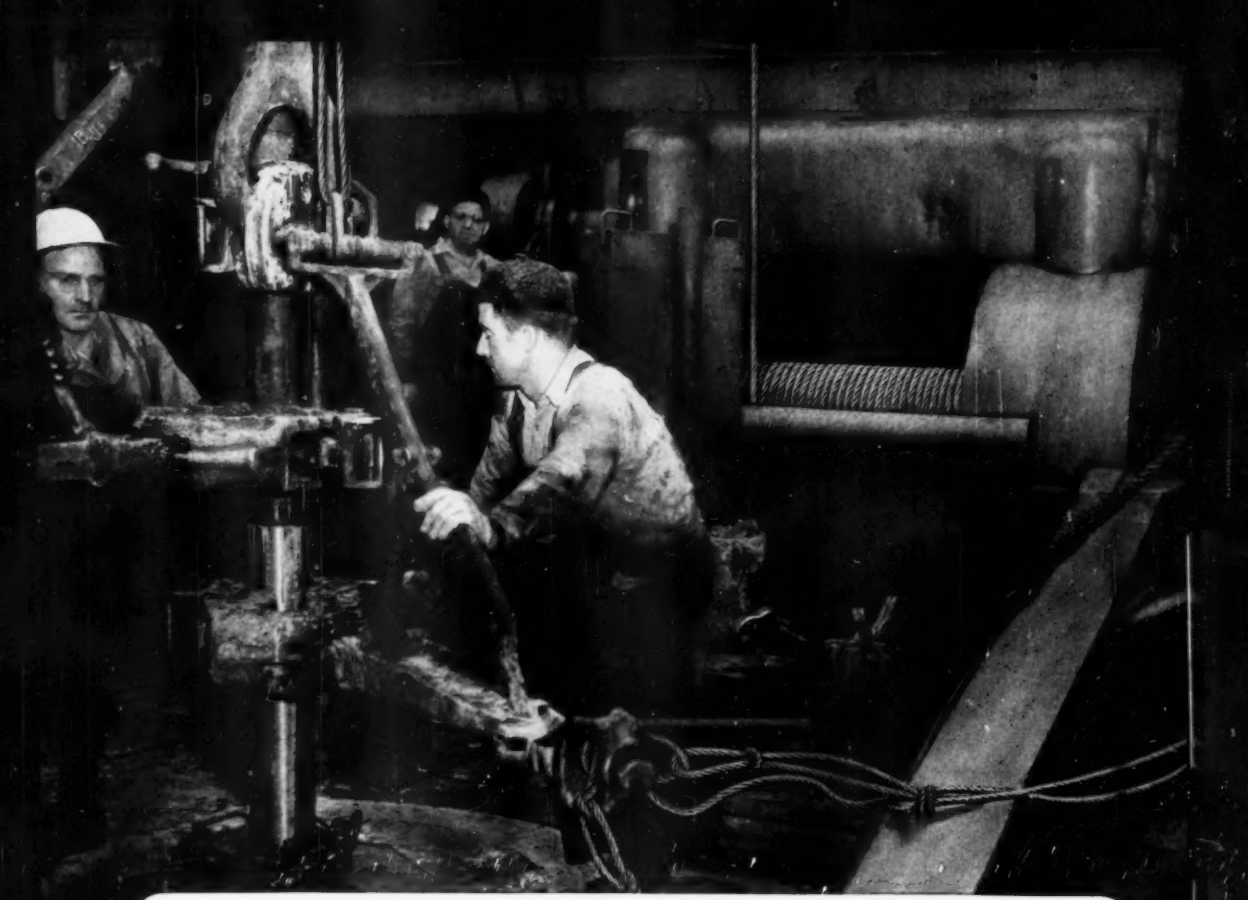
American Gas Association, annual convention, Chicago, October 17-20.

American Institute of Mining & Metallurgical Engineers, Petroleum Branch, fall meeting, Elk's Club, Los Angeles, October 20-21.

LEGAL

U. S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Washington 25, D. C. Notice is hereby given that the lands listed herein are offered through sealed bids on the terms hereinafter specified, to qualified bidders of the highest cash amounts per acre as a bonus for the privilege of leasing the lands under sec. 17 of the Leasing Act of February 25, 1920 (41 Stat. 437; 30 U.S.C. sec. 181), as amended. All bids must be submitted to the Director, Bureau of Land Management, Washington 25, D. C., on or before 1 p.m. of the date set out herein. Each bidder must submit with the bid one-fifth of the amount bid in cash or by certified check on a solvent bank or by money order made payable to the order of the Treasurer of the United States, and file the showing of qualifications to receive a lease required under 43 CFR 192.42 (b) and (c). The envelopes should be plainly marked that they are not to be opened before the date and hour set out herein, and should show the number of the parcel and the name of the field. No bids received after the hour fixed herein for receiving bids will be considered. The remainder of the bonus and the annual rental must be paid and an acceptable surety bond in the sum of at least double the amount of rental, but in no case less than $1,000 nor more than $5,000, must be furnished by a successful bidder prior to the issuance of a lease. An acceptable $5,000 surety bond will be required prior to commencing drilling operations on the land. The deposits of the other bidders will be returned upon acceptance of the successful bids. Bidders are warned against violation of section 59, U.S. Criminal Code, approved March 4, 1909, prohibiting unlawful combination or intimidation of bidders. The right is reserved to reject any and all bids. Royalties payable to the United States will be at the rate of $12\frac{1}{2}$ per cent to 25 per cent for oil, and $12\frac{1}{2}$ per cent to $16\frac{2}{3}$ per cent for gas, in accordance with Schedule B in the lease form. Annual rental will be at the rate of $1.00 per acre. The lands are in the known geologic structure of the Half Moon Field and are offered in the following parcels, all in T. 51 N., R. 102 W., 6th P.M., Wyoming: Parcel No. 1, sec. 14, $SW\frac{1}{4}SW\frac{1}{4}$; sec. 15, $SE\frac{1}{4}SE\frac{1}{4}$; sec. 22, lot 1, 119.92 acres. Parcel No. 2, sec. 26, $N\frac{1}{2}NE\frac{1}{4}$, $SE\frac{1}{4}NE\frac{1}{4}$, 120 acres. Total 239.92 acres. Bids must be submitted on or before 1 p.m., daylight saving time, June 22, 1949, and must be submitted on each parcel separately, but no objection will be made to the award of both parcels to the same successful bidder. Marion Clawson, Director.

TABLE OF CONTENTS ON PAGE 35



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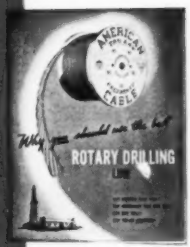

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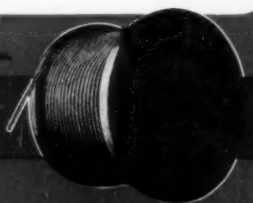

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